IAVE

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

the exciting story of the processing of taconite

(see page 246)

Space-Age Industrial Arts, Wright

The Counselor and Vocational-Industrial Education, Smith

Mass Production in Industrial Arts, Spencer

October, 1959

HE cannot afford less...

This year, as every year, thousands of young men will reach the point in their education where the purchase of a set of drawing instruments is required. Not only is this a new experience, but one of much greater importance than most realize. Drawing instruments are not purchased like a text book for a few months use and then sold or shelved when the classwork is over. Instruments become a lifetime possession, a constant companion throughout the career for which the young man is training. When the student uses fine drawing instruments, their precision inspires precision. The pride of ownership inspires pride in accomplishment. As the twig is bent, so grows the tree. Men without high standards and discriminating judgment can never be able engineers.

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IA / VE

Vol. 48, No. 8 / October, 1959

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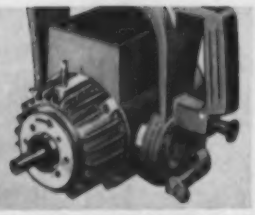

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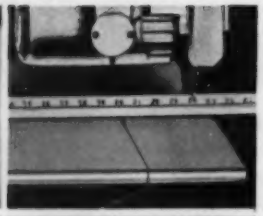

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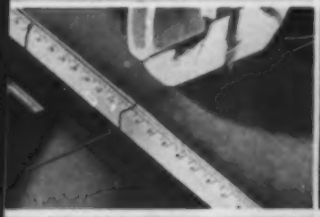

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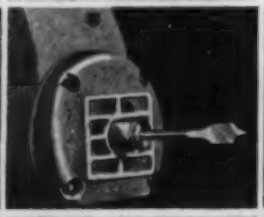

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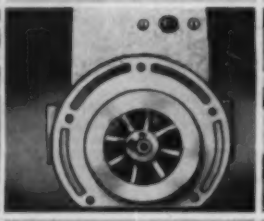

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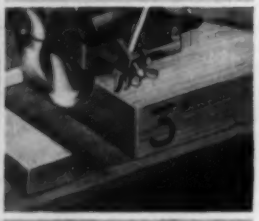

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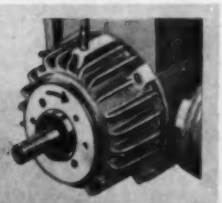

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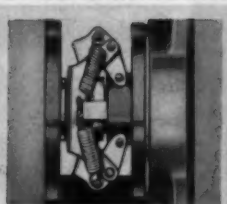

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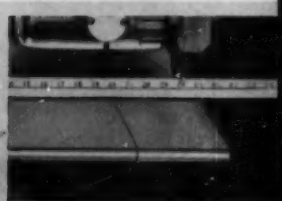

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DROP-LEAF SAFETY TABLE
eliminates exposed saw up-front
EXTRA SAFETY FOR STUDENTS!

the bulletin board / news notes and trends in industrial education

FORD PROJECT AWARDS

Winners of the 700 cash prizes offered in the thirteenth annual Industrial-Arts Awards contest, sponsored by Ford Motor Company, were announced recently. Included in the list were the winners of 32 Outstanding Achievement Awards, the top prize in the competition.

Cash winning projects, which were selected from more than 4200 entries sent to Dearborn, Mich., for final judging, came from 39 states, the District of Columbia, Canada, Puerto Rico, and Hawaii. Winners share approximately $50,000 in cash and other awards.

A panel of judges, including vocational teachers, skilled craftsmen and engineers, selected the final 700 winners, and awarded 32 Outstanding Achievement Awards to 32 students, for projects considered best in craftsmanship, ingenuity, and creative design.

FIRE PREVENTION WEEK

Fire Prevention Week will be observed this year from October 4 through 10, 1959. Traditionally, Fire Prevention Week is celebrated during the week which includes October 9. This is the anniversary of the Great Chicago Fire which took place in 1871. This annual "Week" is observed at the same time both in the United States and Canada. These facts were revealed by the Fire Equipment Manufacturers' Association, Inc., a national trade association whose members manufacture and market all types of portable fire extinguishers and related fire-fighting equipment.

NEW DEGREE PROGRAM OFFERED AT FRESNO

A new degree program, designed to provide preoccupational training in industrial technology with emphasis on physical science and industrial management, has been offered since February, 1958, at Fresno State College, Fresno, Calif.

Students qualify for a Bachelor of Science degree with one hundred and twenty eight units. Options may be chosen among the following fields: automotive industries; drafting; electrical industries; graphic arts industries; metal industries; and wood industries. There is the opportunity for minor specialization deemed desirable in consideration of individual vocational objectives.

Professor Marion Grosse, chairman of the division of applied arts, has appointed Richard Newcomb to be the co-ordinator of the Industrial Technology program.

FREE FORESTRY TEACHING AIDS

Teachers seeking conservation materials will be interested in a new booklet and two newly revised publications put out by American Forest Products Industries. The new book, "Trees and Game — Twin Crops," explains the relationship between forest management and wildlife management. Arthur Carhart is the author. The book is available to teachers only.

The revised teaching aids are "The Story of Lumber," and "The Story of Pulp and Paper," both of which have been distributed to grades 8 and up for the past eight years. They cover the history and manufacturing processes of lumbering and papermaking. A glossary has been added as an aid to vocabulary growth and understanding of technical processes. Both books are available in classroom quantities.

American Forest Products Industries, Education Division, 1816 N Street, N.W., Washington 6, D. C.

PITTSBURGH SCHOOL WINS NATIONAL ACCREDITATION

The National Council of Technical Schools has announced that Penn Technical Institute of Pittsburgh has been added to its approved list of technical institutes. Penn Technical Institute, located at 5440 Penn Avenue, offers a twenty-one month program in electronic technology. Approval was granted only after a rigid examination was made of the school's curriculum, faculty, and facilities, including a personal inspection by educators and representatives from local industry.

Louis A. Dimasi is the director of Penn Technical Institute.

new safety feature!

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Automatic Safety Gear now standard equipment on 10" and 11" models

12" Lathe

All Logan 11", 12" and 14" lathes, as well as models 1825 and 1875 (*shown*) 10" lathes, now offer positive overload protection without additional cost. Exclusive Automatic Safety Gear absorbs shock of sudden overloads when threading. Preventing gear damage from spindle to gear box. Also protects all gears in gear box up to 52 threads per inch. The combination of this Safety Gear and spring-loaded lever-operated clutch in apron gives the same protection for corresponding feeds. Can be factory-installed on other models of new 10" and 9" quick-change lathes. Available for present Logan quick-change lathes: $10 for 9", 10" and 11" sizes, $15 for 12" and 14".

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No. 902B shown has 12" combination square, 1" micrometer, center gage, center punch, 6" rule, 4" inside and outside calipers, dividers and hermaphrodite calipers. Many other sets to choose from.

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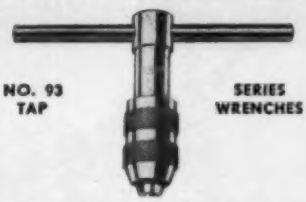
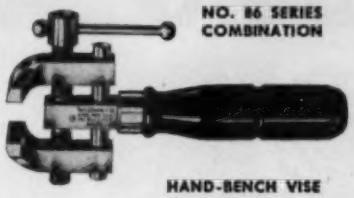


NO. 93 TAP SERIES WRENCHES

Sturdy, positive-holding wrenches with sliding T-handles for hand use — also nicely balanced and centered for use in lathe center or drill press. Set of four holds taps from 1/16" to ½".



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(For more information from advertisers, use the postcard on page 55A)

questions / answers

DRILLS WITH REVERSING SWITCH

● Q.: Referring to your December, 1957, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine, page 9A, the Black & Decker advertisement, I do not understand how the drill which turns clockwise also turning spool clockwise, should cause spool to unwind, therefore not pulling train. How is this possible? — *F. M.*

A.: The Black & Decker representative says: "Every drill above the smaller sizes has a reversing switch in the mechanism." — *J. J. M.*

LIST OF HAND TOOLS RECOMMENDED

● Q.: Kindly give me a list of the hand tools needed in a general wood shop. — *R. H.*

A.: See article on "Industrial-Arts Equipment List — Comprehensive General Shop," in the May, 1946, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, pages 204 to 211. — *J. J. M.*

SPRAY PAINTING EQUIPMENT

● Q.: Can you give me the names of spray painting equipment firms. If so, I would like to have their addresses also. — *N. M. P.*

A.: The following companies supply spray painting equipment: Binks Manufacturing Company, 3114 Carroll Avenue, Chicago 12, Ill.; W. R. Brown Corporation, 5720 W. Armitage Avenue, Chicago 39, Ill.; and De-Vilbiss Company, 268 Phillips Avenue, Toledo 1, Ohio. — *J. J. M.*

INFORMATION ON BOOKBINDING

● Q.: Can you refer me to articles on bookbinding which have been published in earlier issues of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION? — *H. G.*

A.: The articles listed here on the subject of bookbinding have appeared, as indicated, in our magazine:

1921 — August, p. 320 — "Book Binding Course in the Cass Technical High School, Detroit, Mich."
1925 — January, p. 22 — "Book Binding, Repair, and Rebinding"
1925 — February, p. 54 — "Book Binding, Repair, and Rebinding"
1925 — March, p. 103 — "Book Binding, Repair, and Rebinding"
1925 — April, p. 144 — "Book Binding, Repair, and Rebinding"
1933 — July, p. 235 — "Leather Book Cover"
1936 — May, p. 158 — "An Easy Method for Binding Loose Leaves"
1938 — April, p. 150 — "Bookbinding as an Industrial Arts Subject"
1939 — December, p. 417 — "A Simple Bookbinding Project"
1940 — November, p. 378 — "Appointment Book"
1944 — May, p. 205 — "Binding the School Annual in the Print Shop"
1946 — September, p. 309 — "How Bind the Book?"

— *J. J. M.*

COURSE OF STUDY ON PRINTING — HIGH SCHOOL LEVEL

● Q.: I am endeavoring to prepare a course of study on the printing trade, high school level. I have searched through several back issues of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION for material relating to this endeavor, and have found several useful articles. I would be very appreciative of any effort on your part to aid me in obtaining additional information.

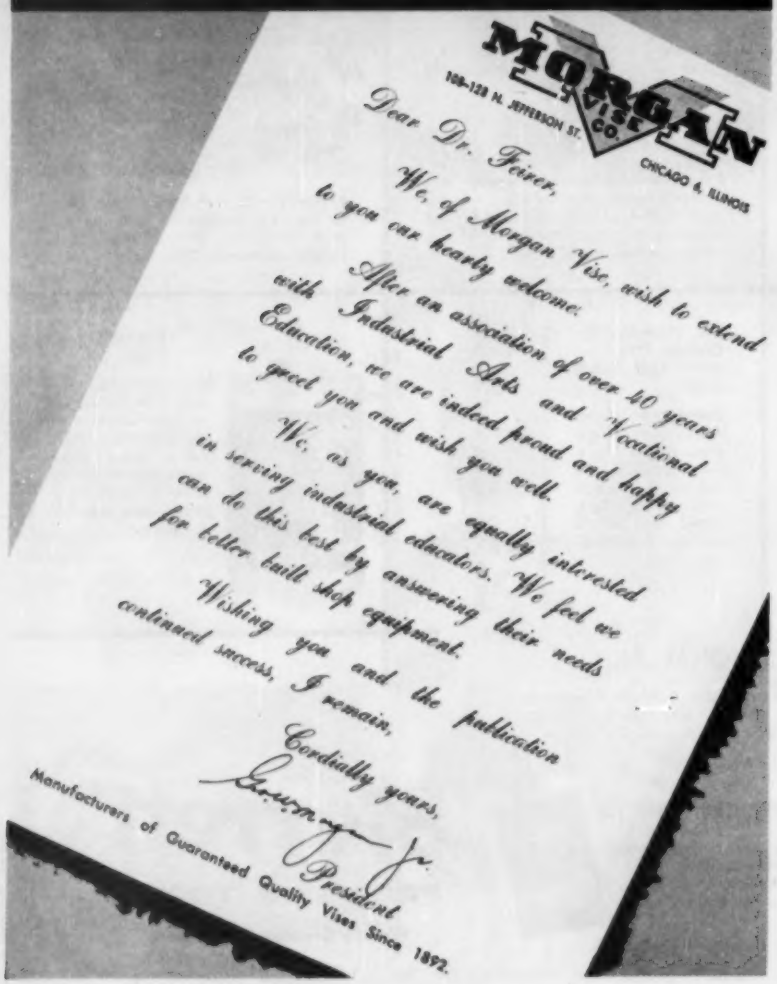
— *I. M. E.*

A.: Articles suitable for preparing your course of study on the printing trade which have appeared in our magazine are as follows:*

1952 — Jan. — Recognizing the Printers' Demons, Francis J. Kafka — page 32
March — Course of Study for the Graphic Arts Shop, John M. Fontana — page 95
1953 — Jan. — A Basic Glossary and Vocabulary in Printing, Ernst H. Suerken — page 13
1955 — March — Co-op Plan for Training Printers, R. J. Mackin — page 94
1956 — March — Outline for a Graphic-Arts Laboratory, Otis H. Chidester — page 75
1957 — Feb. — Increasing High School Industrial-Arts Enrollment, John E. Cogoli — page 34
1958 — Feb. — Graphic Arts Teaching Aid, Donald G. Brossman — page 47 — *J. J. M.*

**Ed. Note:* We are not in a position to furnish the pages of these issues, nor the complete copies in most cases. We would recommend looking at this material at your public library, the high school library, the libraries of the supervisor of industrial arts or of vocational education, or teachers of these subjects who keep or bind their back copies of our magazine.

MORGAN VISE welcomes
Dr. Feirer as new editor of IA/VE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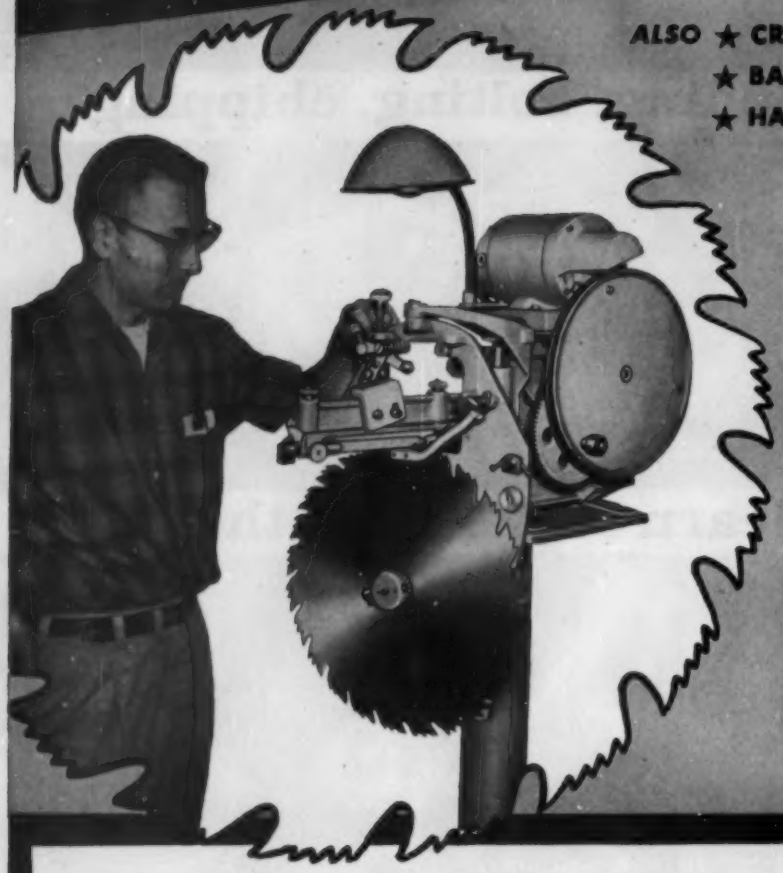
★ BAND SAWS
★ HAND SAWS



It's the new Model 200

FOLEY *Automatic* SAW FILER

THE NEW model 200 Foley Automatic Saw Filer is the *first* and *only* machine which will file the so-called "combination" (rip and crosscut) circular saws; also crosscut circular saws, band saws, all types of hand saws.

The Foley Saw Filer is doubly valuable in manual training departments—it keeps all your saws in perfect cutting condition at low cost and greatly prolongs their life; it also is a great asset for training students in the correct care and maintenance of both hand and power saws. With the Foley Saw Filer, the Foley Retoother (for hand saws) and Foley Power Setter, (last two not shown) you can sharpen *4 to 6 hand saws per hour.*

The exclusive Foley principle of jointing the saw as it is filed, keeps all teeth uniform in size, shape and spacing; it also keeps circular saws perfectly round. This assures a fast, smooth, true cutting saw that stays sharp longer, runs cooler, and frequently doubles the life of the saw.

30-DAY TRIAL OFFER

You may try the new Model 200 Foley Saw Filer in your own shop for 30 days. See for yourself its precision work, advanced design and quality construction—time-proved through more than 50 years manufacture and use of previous models. Write for literature and details of 30-day trial offer.

FOLEY MANUFACTURING COMPANY
3318 N. E. 5th St., Minneapolis 18, Minn.

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new! WILTON VISE MAKES GENERAL SHOPS PRACTICAL!

the new **WILTON** Universal Turret Vise

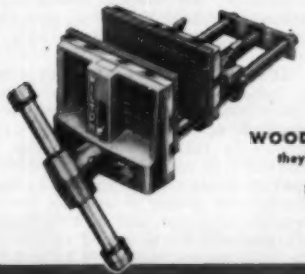
FOR GENERAL SCHOOL SHOPS

FEATURES:
3" x 7" MAPLE JAW FACES
Wilton's patented RAPID ACTION
REMOVABLE 1" x 4" SERRATED STEEL JAWS
DOG IN FRONT JAW • WOOD HANDLE
ART METAL SOCKET • OFFSET WOOD JAW
FOR VERTICAL CLAMPING OF
LONG WORK PIECES

The Wilton "Universal" is a *new tool* that makes the general school shop truly practical! It helps you expand your curriculum at minimum equipment cost. It holds metal, wood, art metal anvils, sheet metal, pipe — *everything* you want to teach!

U. S. Patent 2430458
Additional U. S. Pat. Pending

WILTON PROFESSIONAL QUALITY VISES FOR SPECIALIZED SHOPS



WILTON WOODWORKERS' VISES
they're waterproof and
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Unconditionally
guaranteed!

WILTON MACHINISTS' VISES
with lifetime sealed in
lubrication!
Unconditionally
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MAIL COUPON FOR FREE CATALOG OR DEMONSTRATION, AT NO OBLIGATION OR COURSE.

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WILTON TOOL MANUFACTURING CO., INC.
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WILTON TOOL MANUFACTURING CO., INC. VE-109
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☐ I would like to see a demonstration of the new Wilton Universal Turret Vise for General Shops.
☐ Please send me more information on Wilton Vises.

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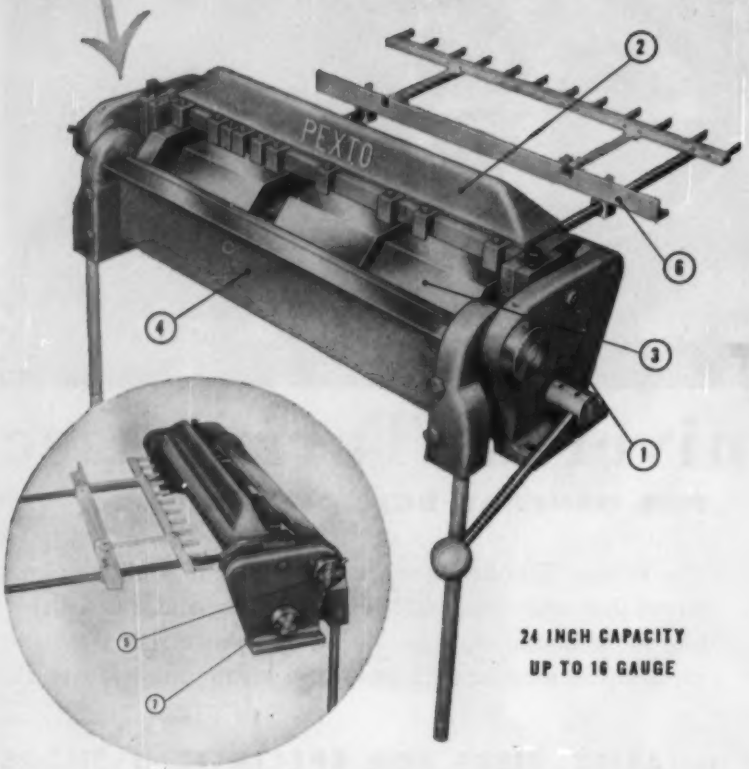
again from PEXTO

another step forward for SCHOOL and SHOP

NEW!

PX-24

BOX and PAN BRAKE



24 INCH CAPACITY
UP TO 16 GAUGE

1. **FRAME** — Rigid one-piece machine-tool-grade casting.
2. **UPPER BAR** — Positively positioned, all ways. Eccentrics — Straddle mounted — in frame for rigid clamping of sheet.
3. **FINGERS** — Toughened die steel, precision ground.
4. **FOLDING BAR** — Swings easily on needle bearings.
5. **STOP COLLAR** — Adjustable to any angle 0° to 135°.
6. **BACK GAUGE** — Full gauging range from 0" to 24".

7. **SAFETY BRAKE** — Adjustable Friction-brake Lock.

The attractively priced, new PX-24 Box and Pan Brake has every quality and safety feature for which PEXTO machines are known. It's a small but rugged machine ideally engineered for hard use.

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THE PECK, STOW & WILCOX CO. Southington, Conn. U.S.A.

A complete line of machines and tools for Sheet Metal Fabrication

personal / news

Degrees and Awards . . .

● *Rudolph "Duff" Roen,* who has retired as supervisor of building and maintenance at Stout State College, Menomonie, Wis., a Governor's Service Award for 26 years of distinguished service to the state of Wisconsin. He began work at Stout as a carpentry-maintenance man in 1932. The presentation was made by Dr. Verne C. Fryklund, president of Stout State College.

Appointments . . .

● *Arthur Hauler* as acting director of the Industrial Arts Division at Oswego State Teachers College. He will serve as director of the division during the one-year leave of absence taken by Division Director Dr. Robert D. Helsby. Dr. Helsby has taken the leave to accept an appointment as deputy industrial commissioner for administration in the State Labor Department.

● *Dr. Robert E. Turner,* who has been in charge of the electronics instruction in the Department of Industrial Education at Northwestern State College of Louisiana, Natchitoches, resigned at the end of the summer session. He will be in a similar position at the Arizona State College, Flagstaff, Ariz.

● *Walter E. Weffenstette* as electronics instructor in the Department of Industrial Education at Northwestern State College of Louisiana, Natchitoches, La., beginning with the fall semester. He received the B.S. degree from the University of Illinois. He received the M.S. degree and is currently engaged in research for his Ph.D. degree at Southern Illinois University at Carbondale. He has held teaching positions at various Illinois and Indiana schools and in the Technical Institute at Southern Illinois University at Carbondale. He has held teaching positions at various Illinois and Indiana schools and in the Technical Institute at Southern Illinois University.

● *Dr. Raymond Van Tassel* as chairman of the department of vocational education in the School of Education of New York University, replacing Dr. Robert Thompson. This department includes the undergraduate curricula of Industrial Arts, Occupational Therapy, Vocational Rehabilitation, Aeronautical Education, Vocational-Industrial Education, and various Master's, Sixth-Year, and Doctoral Programs.

He began his teaching career as a teacher of industrial arts in the Suffern, N. Y., Junior-Senior High School, and was also principal of the Suffern Junior High School. In 1937 he came to New York University as an instructor in the department of vocational education and advanced through the grades of assistant professor, associate professor, and in 1957 became a full professor in the School of Education. He holds degrees of B.S., M.A., and Ed.D., from New York University.

● *Robert Hostetter,* formerly of Manheim Township Schools, Neffsville, Pa., and *Frank Kafka,* Public Schools, New York City, have joined the staff of the industrial arts department at Millersville State Teachers College, Millersville, Pa.

● *Dr. George J. Resnikoff* as director of the department of industrial engineering at Illinois Institute of Technology, Chi-

(Concluded on page 26A)

(For more information from advertisers, use the postcard on page 55A)

Another great
W-T "Light-Heavyweight"...

New

WT
ALKER-TURNER

17"
DRILL PRESS

In Floor and Bench Models

This new Walker-Turner "Light-Heavyweight" is a natural for school shop instruction—safe, dependable, accurate, and economical. It has the ruggedness to stand up under rough student handling and still last for years, with little or no servicing needed. And for added safety, the pulleys and V-belt in this unit are totally enclosed in an all-steel housing.

Other features of this new 17" drill press that will help make your teaching more effective include: convenient table raising mechanism, easy-to-read depth scale, and table which can be positioned at any angle up to 90°, right or left (alignment pin facilitates locating table at level and at left and right vertical positions). Your Walker-Turner distributor (listed under "Tools" in your Yellow Pages) will be glad to give you complete information.

FREE CATALOG

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LIGHT-HEAVYWEIGHT MACHINE TOOLS

another fine product by
ROCKWELL

DESIGNED

to teach basic machining skills with minimum investment

U.S. — BURKE Milling Machines offer ease of instruction on all standard milling operations, help teach fundamental principles through duplication of actual shop operations in miniature.

- **Perform All Standard Milling Operations**
- **Simple Operation Increases Value as Instructive Aids, Permits Practical Shop Teaching**
- **Within Cost Range of School Shops**
- **Accuracy Certified, Rigidly Built**

The NEW. U. S. MILLRITE

Large Capacity! ***Low Price!***

The MILLRITE, a full size ram and turret vertical milling machine, permits training students on the type mill they will later operate. And yet its cost, competitive even with used machines of similar capacity, puts it within the reach of all schools.

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Burke Bench Millers — 2 hand, 2 power feed models. #9 B & S Taper • Heat treated, ground spindle mounts in Timken bearings • ½ HP standard or gearhead, or ¾ HP Lima motor • 3 spindle speeds with standard, 12 with Lima motor • Range 66 to 2875 RPM depending on motor selected.

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Greater Strength
More Capacity
Maximum Safety

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WOODWORKING-METAL SPINNING LATHE

New speed lathe by "Oliver" features a completely new concept in design and construction. Welded steel construction, new manufacturing techniques make this the strongest, most rigid lathe on the market. Send for free color folder.

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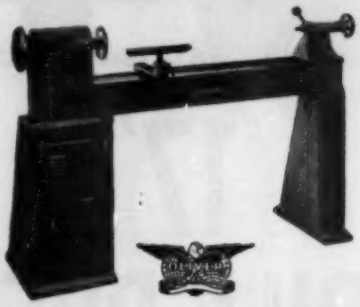

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PARKS PLANERS Give Your Students Practical Experience on Popular Industrial Machines

. . . the experience of working on the same type of high-speed planers they will eventually use in their trade.

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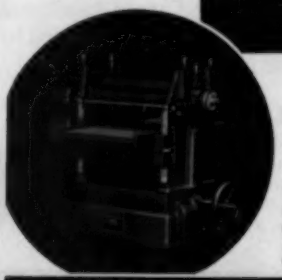
PARKS NO 20—A modernly designed, precision-built, high speed production surfacer that planes lumber up to 20" wide and 6" thick. Available with knife-grinder at additional cost.



12" THICKNESS PLANER

PARKS NO. 95 — A compact, sturdy thickness planer that offers mill planer precision and ruggedness at a sensationally low price. Write for descriptive literature on both machines illustrated as well as on PARKS wood- and metal-cutting Band Saws, Radial Saws, Planer-Jointer Combination Machines.

The PARKS WOODWORKING MACHINE COMPANY
Manufacturers of Quality Woodworking Machines Since 1887
Dept. 22, 1546 Knowlton Street, Cincinnati 25, Ohio

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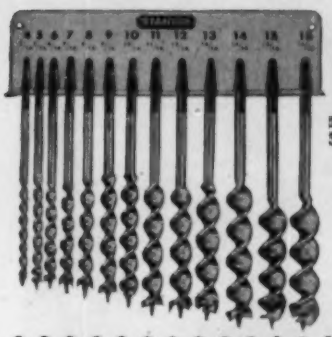
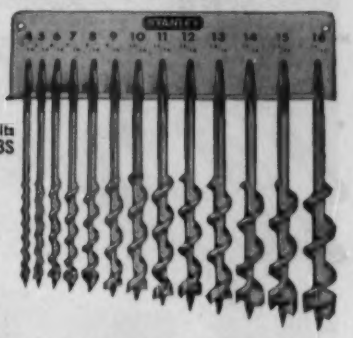
STANLEY SHOP TALK



AUGER BITS IN RACKS



Stanley Russell Jennings Bits
Set No. 1013S

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Set No. H1213S

13 sizes of auger bits in this useful rack, with a notch for each size indicated by number and by sixteenths so your boys can always return them to the right notch. The metal rack is supplied with each set of bits ordered. Sizes from 4/16 to 16/16 inches

STANLEY STEELMASTER

The finest hammer ever made! Tubular steel handle that will not break under normal use . . . has shock absorbent neoprene grip. Rim of face is induction coil tempered . . . an important safety feature that minimizes chipping. Perfectly balanced. Available now in 13, 16 and 20 oz. curved claw models, and 16 and 20 oz. ripping claw models.

BLOCK PLANE

The Stanley "100 PLUS" No. 118. Here's an all steel, low angle plane that's really BOYPROOF. Only three pieces, and the locked-in cutter adjustment prevents thread stripping or lost parts.

No. 118

JUNIOR JACK PLANE

Stanley No. 5¼ Junior Jack. The ideal plane for boys at the junior high school level. Fast, clean cutting, easy to adjust, it's 11½ inches of balanced performance with the usual high quality Stanley workmanship and materials. 1¾" cutter.

No. 5-1/4

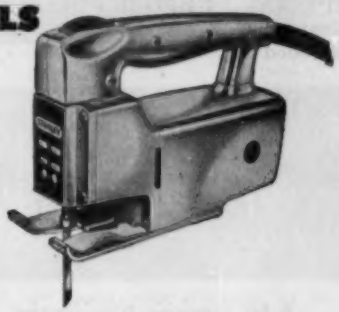
HEAVY DUTY ELECTRIC TOOLS

H264 ROUTER

This ⅜ hp Stanley Router is packed with many new features. Safe Switch-Shaft Lock starts and stops router and automatically locks shaft. Spot Light lights the way along the work.

H31 BELT SANDER

The Stanley Belt Sander takes the work out of sanding, whether it's for rough sanding or fine finishing of wood, metal or plastic. Easy to change 3" x 24" belts.



H75 SABRE SAW

The sabre saw is a versatile portable saw furnished with three blades and eighteen more to select for every use. It will rip, crosscut or jig saw and will also cut plastics, rubber and metal.

Use this coupon for more detailed information and school shop help

STANLEY

STANLEY TOOLS, Educational Dept.,
470 Elm Street, New Britain, Conn.

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FREE ( ) Please send me the Stanley Electric Tool Catalog 589

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PULL 'EM

easily,
safely,
speedily
with

Snap-on

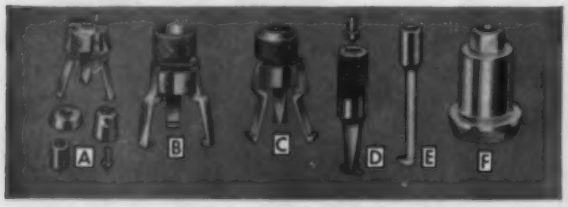
UNIVERSAL PULLER and SPECIAL HEADS

Snap-on CJ-68-B puller set

These *Snap-on* puller tools will handle a wide range of pulling jobs in your auto shop. Combination two and three-way yoke works with pressure screw or slide hammer action. Either way, it gives you safe, no-slip, no-tip action over the entire pulling range.

Small, medium and large jaws are interchangeable for small or large work — inside or outside pulling. Short screw services jobs in close places where slide hammer cannot be used.

SPECIAL-PURPOSE PULLING HEADS adapt the *Snap-on* Universal Puller for these special jobs (not included in above set).



- **A** for removing tight bearing races.
- **B** for all sizes of axles.
- **C** to pull grease retainer and axle bearing in one operation on Chevrolet cars and trucks.
- **D** for pulling grease retainer.
- **E** to pull large pilot bearings as well as grease retainers and bearing races.
- **F** tapered-thread oil seal puller — available in four sizes.

Many other *Snap-on* pullers are available to fit your classroom needs. Ask your *Snap-on* man for information on the complete line. Write for free puller wall chart.

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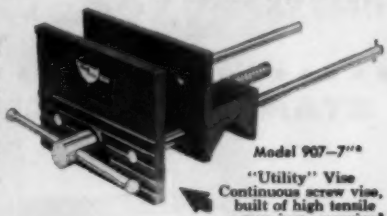
NEW... Vises
NEW... Features
NEW... Low Prices

Before you lay out a dime, compare new shop-tested Milwaukee Vises with all others. Milwaukee values will amaze you . . . feature-wise and price-wise. Today, write for catalog 17 describing all models.

Models 909—9"*
912—12"*
"Double Action" Vises

On each, movable jaw positions in or out without using screw. Built of high tensile grey iron . . . oversized guides and screws, balanced steel handles, many other features.

*Jaw Width



Model 907—7"*
"Utility" Vise
Continuous screw vise, built of high tensile grey iron, oversized screw and guides.

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KALAMAZOO

Model
8CW-B1
Automatic Cut-off
Machine

$1485.00 COMPLETE

If cutting costs and increasing production are most important to you, then the 8CW-B1 is the saw for you. Its low cost, completely automatic operation has been job tested and approved for accuracy and efficiency using low cost carbon steel blades. Write today for prices and literature, or contact your local authorized Kalamazoo distributor.

MACHINE TOOL DIVISION
KALAMAZOO TANK and SILO COMPANY
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Pittsburgh Color Dynamics®

assures better, safer working conditions

. . . and tomorrow's shopmen must know how to use this modern painting system to improve efficiency and morale

Educators in hundreds of schools recognize the importance of color in industry. They're teaching pupils how to apply the principles of Pittsburgh's system of COLOR DYNAMICS to improve productive efficiency, enhance morale and reduce danger of time-loss accidents.

• **COLOR DYNAMICS** is a method of using color based upon the simple principles of the energy colors possess. Some colors stimulate and excite, others soothe and relax, still others fatigue and depress.

• **By the proper application** of COLOR DYNAMICS principles in choosing colors for machines, the operators' attention can be better focused on their work. By using focal colors, stationary parts are readily distinguished from moving parts and production materials. Eye travel is reduced and eye fatigue is lessened.

• **Morale-building colors** on walls and ceilings promote cheerfulness and lessen mental depression among workers. Use of safety colors reduces the hazards of injuries.

• **If you desire** your students to be better equipped for their future work in industry, begin now to teach COLOR DYNAMICS in your school.

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• Write today for a free booklet which explains the principles of COLOR DYNAMICS and how they can be applied efficiently and advantageously in industry. Better still, we'll be glad to demonstrate its benefits in your classrooms by providing you with a detailed color plan for your study areas and equipment, without cost or obligation. Call your nearest Pittsburgh Plate Glass Company branch and have a representative see you. Or mail coupon at right.

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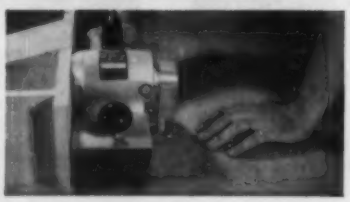
2-SPEED SKIL 4" BELT SANDER Only $94.50

HIGH BELT SPEED (1100 fpm) for sanding rough lumber fast. **LOW (800 fpm) SPEED** for satin smooth finishing and paint and varnish removal.

KING SIZE 4" BELT covers 20% more surface than 3-inch sanders. No. 21407 Vacuum Dust Pick-up Kit (illustrated) is available for cleaner, safer, dust-free sanding.

20% LIGHTER WEIGHT plus contour grip rear handle and front knob make this sander easier to use.



FLUSH SIDE DESIGN allows sanding up to vertical edges. *Ask your SKIL distributor for a demonstration of the low cost Model 805 Belt Sander today. Or mail coupon.*

4" MODEL 805 SKIL BELT SANDER: 7 amp motor; Universal AC-DC up to 60 cycles for standard 115 volt (220 volt at no extra cost.) Convenient adjusting knob centers belt on pulleys. Gearless transmission never needs lubrication. Weight 12¾ lbs.

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☐ Send name of nearest SKIL distributor.
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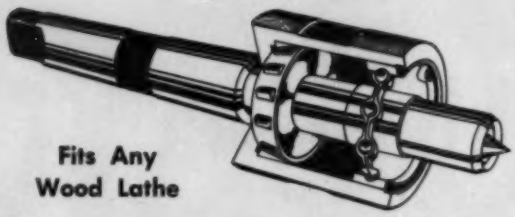
Every Wood Lathe in Your School Shop Needs This . . .

CENTER RITE

(Live Cup Center)



Fits Any Wood Lathe

The All Safety Center

Cup turns with wood. Wood will NOT work loose. No greasing required. The Robinson Center Rite has Aluminum Housing and a steel center head. Choice of No. 1 or 2 MORSE tapers ground to insure perfect fit. Bearings are removable for easy greasing and can be replaced when worn out. Tried and proved by many satisfied users.

All materials and workmanship have a money back guarantee.

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Versatile, Rugged POWER HACKSAW

JEFFERSON 601

COMPLETE with motor and switch, wired, ready-to-go . . . . ONLY $79.00

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This rugged bench model has cast base, heavier guide bars and guide bar support arms with adjustable bronze gibs. Features include 45° swivel vise, pressure relief on back stroke, length gauge bar, Oilite bearings throughout. See your dealer or write for Bulletin No. 257.

Quick Acting

DRILL PRESS VISE

A rugged 16½ lb. vise with jaws 2" deep, 4⅛" wide, 4¼" opening. Simple to set at any angle. Ideal for school shops.

ONLY $11.50

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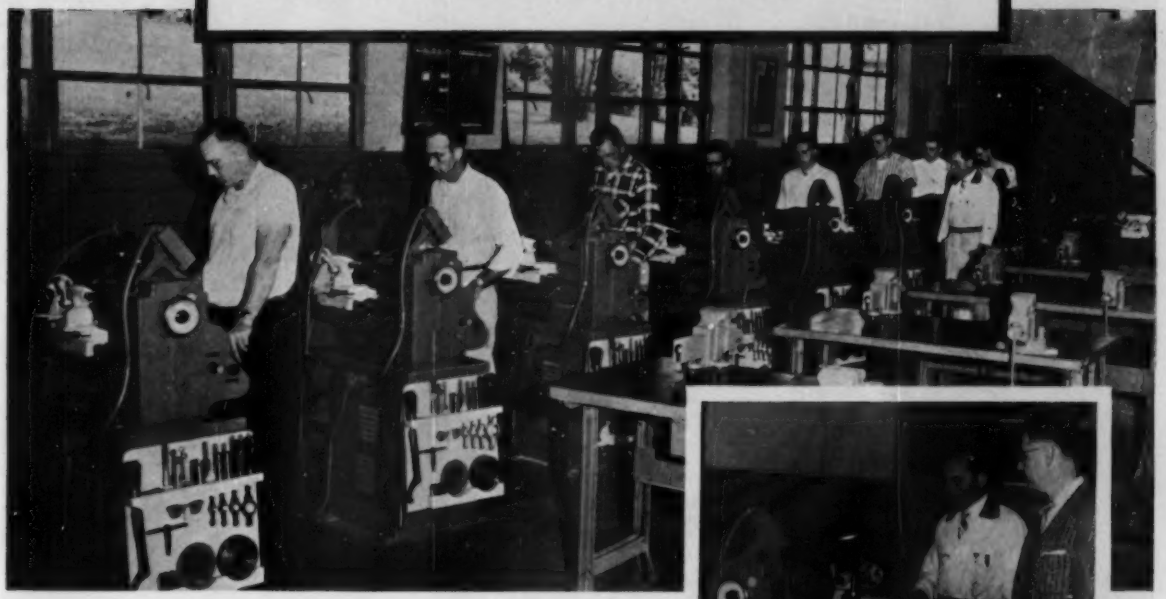
AUSTIN PEAY STATE COLLEGE FINDS CLAUSING 6300-SERIES 12¾" LATHES MEET SCHOOL NEEDS BEST



HERE'S PROOF OF PERFORMANCE

"We wanted a lathe that would be simple to operate, rigid, accurate, of good design, both from the standpoint of mechanical performance and outward appearance. We were also interested in a manufacturer who would readily give service and advice when needed. We found the answer to our needs in the Clausing 6338 Lathe, 10 of which we installed in our industrial arts lab. I am pleased to have this opportunity to recommend the Clausing 6338 Lathe".

DR. LEON BIBB
PROF. AND HEAD OF IND. ARTS
AUSTIN PEAY STATE COLLEGE

Dr. Leon Bibb's endorsement is typical of those we receive from instructors everywhere. They report Clausing lathes set the standard for safety, rugged construction, ease of operation, and VALUE!

The 6300-series lathes have 12¾" swing over bed . . . 21½", 33½" and 47" between centers . . . 54 thread selections, 4 to 224. Headstock, apron and quick-change are *totally enclosed* for greater rigidity, safety, longer service life. Fingers can't get into these danger zones, nor can dirt or chips. All gears and shafts travel in bath of oil. *All* controls are *outside* the machine. Spindle nose is tapered keylock . . . eliminates danger of chuck run-off on braking or reversing.

Flame hardened bed ways for longer wear are standard equipment *at no extra cost.* Spindle turns on Timken "Zero-Precision" tapered roller bearings . . . has 1⅝" thru-hole. Lead screw has easy-to-replace shear pin.

Underneath drive . . . no exposed belts or pulleys. Heavy-duty ball bearing countershaft. Two V-belts drive the spindle . . . belts are outboard for easy replacement.

Get all the facts about Clausing 6300-series lathes. Write for illustrated literature today.

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CLAUSING DIVISION
ATLAS PRESS COMPANY
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A NEW, PRACTICAL WAY TO PLAN YOUR WORK SHOP

WITH NEW

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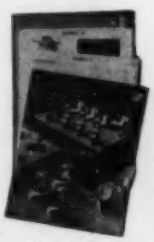

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THE SHOP TEACHERS' PROFESSIONAL MAGAZINE

Industrial Arts and Vocational Education

400 NORTH BROADWAY • MILWAUKEE 1, WISCONSIN

ESTABLISHED 1914

October, 1959

Dear Readers:

I am pleased to introduce the magazine's new editor, Dr. John L. Feirer.

Bringing to this role a deep background in industrial training -- he is currently director of the Department of Industrial Education, Western Michigan University -- Dr. Feirer has an acute awareness of the problems faced by you, the men in the shops and classrooms of our schools on all levels of instruction.

Industrial instruction must be redefined within the framework of the school's modern curriculum. There must be a pinpointing of the problems we face and will be facing.

And effective solutions to these problems in the form of articles and projects and editorials must be worked out, brought to your attention, and adapted in your teaching situations.

Dr. Feirer is alert to these problems and, carrying on from the fine work done by his predecessor, the retired John J. Metz, he will develop an effective approach to industrial education problems in many ways and directions.

As he indicates in his first editorial -- printed on the next page of your IA/VE for October -- the editorial program of IA/VE is dedicated to meeting this "responsibility to the profession."

I hope each and every one of you will make it "must" reading to review Dr. Feirer's statements...and follow his request to help him make this magazine "a real contribution."

Sincerely yours,

Frank Bruce, Jr.

Publisher

FB:JEV

IA/VE

October, 1959 / the editor's stand

OUR RESPONSIBILITY TO THE PROFESSION

What is the purpose of a professional magazine? What should it try to do and how should it do it? These are questions that an editor must ask when he assumes the responsibility for guiding the destiny of a publication such as INDUSTRIAL ARTS AND VOCATIONAL EDUCATION.

Answers to these questions are important. They affect in some way the future of 50,000 professional educators in the areas of industrial arts and vocational education. These answers speak not only for the profession as a group, but for us as individuals. Each one of us has made teaching a life's work. What happens to our field is of concern not only to us personally but also to our families and to the millions of students under our direction.

We are interested in the education of all American youth. Our interests range from elementary and junior high school programs which promote industrial arts as a part of general education to programs of a highly technical nature in junior or community colleges and even four-year colleges. Although our interests are many and varied, we all have a single goal — to provide the best possible education for American youth.

Today industrial education faces a rather paradoxical situation. At the junior high school level the demand for more science and mathematics has made great inroads into shop offerings. In some communities, industrial arts is being eliminated as one of the required experiences of all boy students. At the other end of the educational ladder, greater emphasis is being placed on technical education in community colleges and four-year, degree-granting institutions. These changes have created many problems for industrial education and have amplified other existing problems.

What do we teach? How do we teach it? Where do we teach it? How do we promote better public relations? How do we sell the program effectively to administrators and parents? How do we determine whether we are achieving our objectives? These are all questions of constant concern to all of us in our profession.

What will INDUSTRIAL ARTS AND VOCATIONAL EDUCATION do about these problems and what will the policy be? Simply stated, these are the things that we are going to try to do:

1. To speak out in forthright language on the issues that are of greatest concern to industrial education. We mean to have a strong editorial policy.

2. To point out weaknesses in our profession and to suggest what might be done to correct them. We know that all our readers won't be in agreement with us. We want to have your letters. Obviously, we would not want to see everyone agreeing with us. There is much truth in the familiar calendar motto, "If everyone thinks alike there isn't much thinking."

3. To support the changes and improvements we believe are for the good of our profession.

4. To present well-organized and timely professional articles on topics of greatest concern to the greatest number of our readers.

5. To provide columns on subjects that we believe merit special attention such as good design, research, and guidance information.

6. To print only the "better-than-average" project ideas. We shall always stress the need for better design not only in the exterior appearance of projects but also in their basic construction.

One final word. A professional magazine is only as good as its readers and contributors. *You* are the readers and the contributors. You and you alone can make the above goals attainable. If we believe we are a profession and act as befits members of that profession, then, indeed, this magazine will make a real contribution.

John L. Feirer

Space-Age Industrial Arts

LAWRENCE S. WRIGHT

- Since Sputnik, the cry for **more science**, mathematics, and foreign languages has meant less emphasis on industrial arts.
- The place of **IA in the space-age curriculum** depends upon the industrial-arts teacher and what activities he selects, the content of these activities, and the teaching methodology.

Especially since Russia put her first sputnik into orbit on October 4, 1957, education in this country has been severely criticized. The lack of "enough" science, mathematics, and foreign language instruction has been headlined.

We will grant that strengthening of both science and mathematics offerings is needed. Furthermore, the curriculum should be critically reviewed and the matter of offerings in foreign languages should be studied. The industrial-arts teacher will note, however, that Archimedes' Principle has application here. He pointed out that two physical objects cannot occupy the same space at the same time. If Archimedes were to reformulate his principle on the basis of a proposed "sputnik-centered" curriculum today, he might say: "If a high school student is allowed to carry only four subjects and if all four of these are required subjects, he can't very well take any electives at the same time." Or "Each required subject in the school curriculum eliminates the possible choice of an elective during the time when the required subject is scheduled."

How does all this affect industrial arts? In many quarters, industrial arts has had a history of being less than enthusiastically accepted.

Teachers frequently complain that the bulk of the pupils in their shop are those who cannot do satisfactory work in the classroom. Administrators and guidance counselors do seem to look to the industrial-arts shop for help when boys are unable to do well in their academic subjects. With this attitude on the part of educators it is little wonder that when there is talk of adding science and mathematics to the curriculum there is also talk of less emphasis on subjects or courses in industrial arts.

Is there anything we can do about this? If we do nothing we are doomed to mediocrity and eventually obscurity. Just as the man-made satellite orbits around the planet and eventually disappears as it approaches the atmosphere of that planet, so is industrial arts orbiting around the core of the curriculum. We are not, however, guiltless with regard to the plight in which we now find ourselves and there are several questions which we should carefully explore.

Who Should Take Industrial Arts?

We must admit that we have a program which is unique in the contribution that it can make to slow pupils. We should make this contribution and be proud of it. We have not always properly done what we ought to have done for the average and above average pupils. We surely know that our society today is basically industrial in nature and that industrial arts is usually offered as general education. It is an interpretation of industry through manipulative experiences. It seems logical that this phase of general education is just as important for fast learners as for slow learners.

With all of the "sputnik-centered" emphasis on preparing more and better scientists and engineers, we often fail to recognize the importance of general education for everyone. The citizenry of this country needs to know that it takes a veritable army of industrial workers to produce the necessary parts for a relatively small number of scientists working on a satellite and its carriers.

A recent newspaper article carried the headline: "A Washer Foils Test of Missile." The story was that a defective washer in a switch had caused failure of a projected missile flight at Cape Canaveral. It went on to state that when this difficulty had been corrected the missile fired perfectly. This was not a scientific failure, but a mechanical one. To this writer, it seems as though the space age before us should have an even more important place in the curriculum for industrial arts than has been the case in the past. Girls as well as boys need this work as a part of their general education core.

Dr. Wright is associate professor of industrial arts at Iowa State College, Cedar Falls, Iowa.

What Are the "Solids" in IA?

Industry is so broad that we could hardly include all of it. Even so, some teachers appear to be trying to teach too much. Too much emphasis is being given to some activities and too little to others. The amount of woodwork being taught under the name of industrial arts is all out of proportion to its relative value in the curriculum area as a whole. Too many schools are including crafts at the expense of subject matter which might represent the "solids" in industrial arts.

In the present industrial age and in the space age of the future these "solids" should include technical drawing and sketching as fundamental tools of communication; general electrical and power mechanics; and general metalwork and woodwork with their applied technology. These should form the "solid" core of industrial arts in both the junior and senior high schools. At the junior high level, work in *industrial* arts and crafts and in graphic arts may be included for breadth of understanding. It has been said that there are two great sources of waste in education: Teaching the wrong things brilliantly; and teaching the right things poorly. Industrial-arts teachers must first consider carefully what should be taught and then teach this as masterfully as possible.

Place of the "Do-It-Yourself" Attitude

Industrial-arts teachers, like most teachers, are interested in the development of young people who can think, who can be analytical, and who can be critical. They have often failed to recognize that successful thinking and problem solving cannot be carried on in a mental vacuum. Thinking is predicated upon having facts and understandings. When the "do-it-yourself" attitude is assumed as *the* teaching method for beginning students, this writer believes that little more than "baby sitting" is taking place in the school shop.

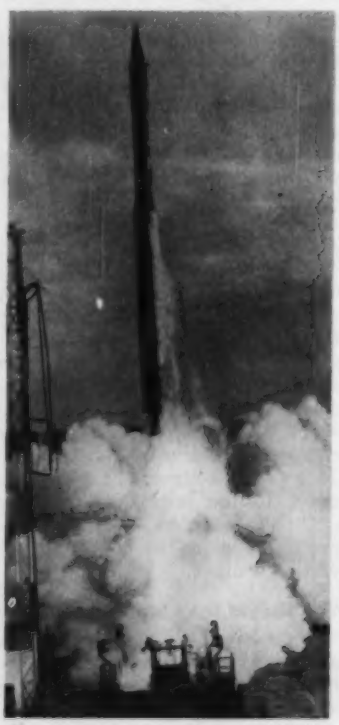
To help young people develop to the point where they can successfully solve their own problems we must first provide the pupils with facts and understandings through well-organized instruction; then have them apply these facts and understandings through controlled experiences; and finally, at advanced levels, pupils should be capable of defining and solving their own problems with a minimum of instructor guidance.

Boys and girls enjoy working with things mechanical. The wise industrial-arts teacher will seize upon the natural urge of his pupils to learn by doing. The pupils should not stop with the doing or activity part. They should pursue the theory and the reasoning connected with the doing. They should be taught the applications.

How to Insure Something Is Taught?

Industrial-arts teachers have avoided the course of study and lesson plan like the plague. As we have larger classes and can give less and less individual instruction, these two age-old techniques assume a larger share of importance. The argument against the use of the course of study and the lesson plans is essentially this: "How can they be prepared when every pupil is working on a different project in a different activity area and will need different instruction?" Those who use this argument should blush for having mentioned it. The chances are that they are teaching nothing.

The contention of this writer is that if we are teaching something, it can be outlined; it can be planned for; and it *should* be outlined and planned for. Until industrial-arts teachers, as a group, are able to present their administrators with well-organized course outlines and carefully made lesson plans, industrial arts will continue to be thought of as a hobby area for the academically slow students.



— U. S. Navy

Some teachers of industrial arts have been opposed to using textbooks in their shop teaching. There was a time when there were but a few textbooks in industrial arts. Especially since World War II an additional number of fine books have appeared. While it would not necessarily be expected that a textbook should be followed without deviation, it should be used in industrial arts to teach knowledge as well as skill.

There has been too little attention to academic standards in industrial arts and too few periodical examinations. If we really expect to provide a challenge for the student who is better than average, we must have higher academic standards than we have used in the past. We must consider a program of written examinations as being as important as performance testing.

We know, of course, that there are those among us who are ashamed to admit that their pupils are acquiring any degree of skill. They are afraid of being branded as having taught for vocational purposes. To them "Vocational" is a naughty word. It seems to this writer that they are overlooking one of the most unique contributions industrial arts can make. At the very least we should subscribe to the idea that if we are teaching anything at all about industry, that every pupil in industrial arts must do whatever he does with whatever degree of skill he can acquire in a reasonable length of time.

Finally, through all of this we should continue to search for new and improved ways of providing the best program of education for all of our youth. The individual should remain the center of attention. The shop teacher should remember that the teacher has not taught unless the pupil has learned.

Will IA Be Part of the Space Age Curriculum?

This is a crucial question. There surely will be a significant contribution that industrial arts can make. Much of the answer depends upon the major activities selected, the content within these activities, and the methodology for teaching them. What we do as industrial-arts teachers *now*, as well as what we do in the immediate future, will largely determine our answer.

- Many of our **counselors** today have a predominantly academic background, weakening the vocational aspects of the school's guidance program.
- On the following pages are two articles considering this important problem: (1) Dr. Smith's **general background of reasons for the situation** with a list of positive approaches to remedy it, and (2) a detailed discussion by Dr. Hammond and Mr. Hazen of one district's method of giving counselors **a practical idea of the world of work**

The Counselor and Vocational-Industrial Education

GLENN E. SMITH

When guidance services first emerged as identifiable activities in the educational program, following fast upon the heels of the early efforts of Frank Parsons in 1908, they were singularly vocational in character. Emphasis was upon job placement, with no overt recognition of any of the other guidance services which today we describe as essential elements of a comprehensive guidance program. Frank Parsons' book, *Choosing a Vocation*, introduced the concept of vocational guidance and described it as a process designed to "aid young people in choosing an occupation, preparing themselves for it, finding an opening in it, and building up a career of efficiency and success." Incidentally, this description of the vocational guidance process, polished with the abrasiveness of a half century of time and experience, stands today substantially unchallenged or modified.

Parsons' early view of guidance services as exclusively vocational was appropriate for the times, inasmuch as standardized tests of aptitude, ability, achievement, and interests were more than a decade from the guidance scene. That is to say, the guidance instruments essential to the refining and use of educational and personal-social guidance techniques were simply not available in Parsons' times. The fact that the pendulum of purpose swung to the extreme of vocational guidance to the exclusion of all other types was both temporary and unavoidable.

Academic Backgrounds

As the fund of tools and techniques adaptable to analysis of the individual strengths and weaknesses of students grew, increased attention focused upon the educational and personal-social problems of students. Counselors, in the years immediately following World War I, initiated rather wide use of the group tests developed by military psychologists and used by the services for classification and placement of personnel. Since these tests were designed to measure mental ability — capacity for further educational development — they opened up the whole area of educational guidance. Since they were of this nature, school administrators frequently selected persons to become counselors who had predominantly academic backgrounds. As this new area of educational guidance burst upon the educational scene, vocational guidance, as perceived by Frank Parsons, entered a period of regression as the pendulum of purpose pointed with favor to the newcomer in the guidance program.

Unfortunately, in many high schools, the vocational aspects of the guidance program have never fully recovered from this middle twenties gyration which perceptibly lessened the emphasis upon the responsibility of the guidance program and the guidance worker for meeting the vocational guidance needs of students. To say that the writer has observed in more than 20 years as a counselor, city guidance director, counselor trainer, and supervisor in two state education agencies that

Dr. Smith is chief of guidance services of the Michigan Department of public instruction at Lansing, Michigan.

counselors spend a disproportionate share of their counseling time with college preparatory students would be only to echo the words of others who have a professional experience similar to mine.

A study of a sample of Michigan high school counselors completed in 1957 revealed some interesting, though not at all startling, information about the practices and attitudes of the group with respect to vocational counseling. Educational counseling, according to respondents, required more of the counselor's time, was considered by him to be more important, and constituted a more enjoyable professional activity than did counseling students with vocational problems. Though it is not always easily possible to distinguish between an educational and a vocational problem, the study appears to indicate that when placed in juxtaposition to educational and personal-social problems, counselors may relegate vocational problems to the slush pile.

Counselors and Vocational Guidance

If counselors are indifferent to or ignorant of the need and importance of vocational guidance, the situation may stem from two main causes: (1) the nonvocational background of the average counselor, and (2) failure of vocational-industrial teachers to *work at the job* of acquainting counselors with the nature and objectives of their instruction and to develop closer personal and professional relationships with guidance personnel in the school.

The first limitation, counselor background, is not always easily overcome, though many seek summer employment of sorts which will enrich their work experience backgrounds in noneducational fields. The second may be overcome in most instances if vocational-industrial teachers will attack the problem in an intelligent, systematic manner. Too often the vocational agriculture, business, homemaking, trade, and shop teacher deplore the practice of counselors of giving too much time to the problems of college preparatory students, twit counselors for their alleged aptness for discouraging all except dullards from enrolling in their classes, or protest loudly that counselors simply do not know what vocational-industrial education is all about.

Now, some of these murmurs may have a certain ring of veracity in some schools. If so, all the more reason for attempting to do something about it. Let those of us who suspect that counselors have only a smattering of knowledge about vocational education heed the popular admonition: "Don't just stand there — *do something.*"

Positive Approaches

The following activities are suggestive of many which teachers might carry out as a positive approach to acquainting counselors with the nature and objectives of vocational-industrial education.

In one school the vocational-industrial teachers had long felt that at least some of the school's counselors seized every opportunity to counsel students away from their classes. Occasionally a student had reported that he was discouraged from taking a vocational course by the counselor. It was decided that each instance in which a student reported being denied the privilege of taking a vocational-industrial course or program, the teacher or teachers concerned would arrange to discuss the matter with the counselor concerned. Several such conferences were held with counselors over the next few months. In every case, the teacher came away from the counselor's office satisfied that the counselor had made what appeared to be the best recommendation to the student that could be made in his case. In some instances in which the vocational-industrial curriculum had been recommended for the student, the counselor was overruled by the student or his parents. While the teacher-counselor conferences had not served to swell the enrollment in vocational-industrial classes, the teachers were unanimously agreed that the conferences had materially strengthened their relationships with the counselors. They had developed a better understanding of the counselor's job and he, in turn, gained a broader and more accurate perspective of the nature and objectives of vocational-industrial education.

In another school in which the vocational-industrial program was under a department head and the counseling staff under a head counselor, the former observed that his staff had heard of instances in which counselors had discouraged students from enrolling in vocational courses. This observation led to a joint meeting of the two staffs which resulted in the following activities designed to encourage a better mutual understanding of each other's programs: (1) the vocational-industrial staff agreed to prepare a statement of the objectives of each subject taught in the department in terms of the skills it was designed to provide students; (2) the counselors were to prepare a statement of their duties and responsibilities and how these might be carried out to serve better the vocational-industrial program, and (3) in addition to several joint staff meetings during the school year, both teachers and counselors were to initiate conferences between members of the two staffs when the best interests of any student suggested the need for them. These activities and mutual understandings erased all signs of friction between counselors and vocational-industrial teachers.

A Series of Workshops

In a third school, the vocational-industrial education staff proposed that they hold a series of workshops jointly with the counselors. The idea came from a shop teacher who felt a need for more skill in helping his students cope with some of the personal problems which they brought to him. A series of three week-end workshops in a camp setting resulted in little by way of written materials, but an improved understanding of the responsibilities and problems of teachers and counselors resulted. Tangible evidence of improved professional relationships appeared in the form of referrals of students from teachers to counselors, and vice versa.

The feeling among many vocational-industrial education teachers that counselors are both unacquainted with and unsympathetic toward their program is often a result of inadequate communication. The counselor expects that the teacher will come to him with information which will orient him to the program with which the teacher is identified, and the teacher waits for the counselor to make the first move.

The important consideration is the welfare and education of the student, not the counselor nor the teacher. Should the teacher and the counselor sometime ask themselves simultaneously, "Are all of my professional actions and thoughts prompted by a desire to serve students?" one would confidently expect that the two would meet quickly in the hall midway between the counselor's office and the teacher's classroom, each having set out to compare notes with the other.

A counselor recently commented: "I wish I could get as close to all of my counselees as the shop teacher is to his students." When I passed this observation on to the shop teacher, he replied, "But I don't know how to help them with their problems like the counselor does." ◀

Summer Interns in Industry

GRANVILLE S. HAMMOND and KENNETH M. HAZEN

Like most American school systems Alliance, Ohio — an industrial city of 30,000 — has recognized the need for a carefully developed guidance program. This article, however, considers only one phase of our counseling service, that of enriching the counselor's knowledge of the industrial world of work by direct contact with industry.

It is our experience that many counselors tend to have a one-sided academic background. They tend to do a satisfactory job of counseling with the student preparing for college. However, there is considerable evidence to suggest that many counselors lack an understanding of the importance of present and future placement of the noncollege student. In addition, an absence of surveys to determine occupational opportunities is, unfortunately, a characteristic of too many communities. This lack of fundamental information and the absence of direct knowledge of jobs prevents a realistic appraisal of opportunities in the local or surrounding communities.

The typical, broad approach to this problem usually includes field trips, Career Days, and occupational surveys. The importance of field trips to visit business and industry is not denied. Career days as a feature of our guidance program are carefully stressed. It is obvious that printed material and surveys can increase the counselor's understanding of occupational trends. Nevertheless, our experience revealed a need for further firsthand contact with industry. If the counselor is to appreciate the significance of such factors as a steady increase in the labor force, changes in relative size of major occupational groups, and the increasing demands for skilled mechanics, repairmen, and technicians, he must spend substantial blocks of time in direct contact with industry.

The question is: "What can the schools do to move teachers away from the academic world into the production world for firsthand experience with industry?" One answer is: "We can place counselors as interns in industry during the summer months."

Dr. Hammond is superintendent in Alliance, Ohio, while **Mr. Hazen** is director of guidance there.

Several Communities Combine

Alliance is an active member of the Industrial Information Institute, an organization of industrial concerns with headquarters in Youngstown, Ohio. The organization was created to help the public understand how everyone makes his living and to help people in this area — especially younger people — to realize that there are better job opportunities at home than there are available practically anywhere in the United States. This organization assumed the leadership role and secured the co-operation of five cities and 14 industries after several exploratory meetings. Previous contacts with industry through Business - Industry - Education days and the use of industrial personnel in guidance classes prepared the way for our joint program. In most communities the interns were scheduled to a specific plant and placed on a regular job through normal employment procedures.

In Alliance, a contact man from industry assisted in creating a more flexible program. Each intern spent three to five days, depending upon

In Alliance, Ohio, school counselors spend their summers as "work interns" for firsthand experience in industry, learning such things as patternmaking (above).

A school counselor in the Alliance, Ohio, district is shown in his industrial intern duties: above, in the employment office; left, working alongside an open hearth in production.

the size and complexity of the industry, in each of five different industries rather than several weeks in a single industry. Under this program the Alliance interns were classified as special school consultants assigned to field duties.

The industrial contact proved to be a valuable asset to everyone. He operated as a liaison agent between the various industrial concerns and the school officials. It was his primary responsibility to see that industrial personnel at all levels understood the purpose of the internship program and to help plan the kinds of experiences that would be of maximum value to school personnel. Usually the initial contact produced a conference with top management. Personnel directors followed through with: (1) an overview of plant operation, (2) a tour of various divisions, (3) a planned, day-by-day schedule of the time to be spent with the industry, and (4) detailed background information adaptable to classroom use.

On a typical day, the mornings would be spent with workers, foremen, and supervisors. The intern had considerable leeway to observe, question, and confer with anyone he desired. Afternoons were frequently used to summarize observations, to develop job descriptions, and to revisit work areas for additional information.

Financial Support

Two basic approaches were used to finance the intern's experience. In one plan the intern was placed on a specific job for the eight-week period and was paid by industry as a worker. An alternate approach, utilized by Alliance, designated the intern as a consultant to the public schools for the purpose of developing resource materials to enrich the counseling program. This approach permitted a maximum of flexibility. In general, the interns discovered it was not necessary to spend eight weeks in a single position or industrial plant in order to get the point of view of the worker and secure necessary data for guidance purposes. If he reached a point of diminishing returns after a few days with a specific industry, he was reassigned to another location.

Orientation of Industrial Personnel

A careful program to acquaint the industrial personnel with the purpose of the program is essential. A climate of clear communication avoids an atmosphere of suspicion. For example, labor needs to know who the visitors represent and why they are observing and questioning workers. In some plants, the "man with the notebook" is suspected of rate studies. Unless an adequate explanation is made, normal discussion and frank opinions are difficult to obtain.

When management fully understands the scope of the program the result is a generous assignment of plant personnel for consultant purposes. Many useful suggestions will then be developed to upgrade the effectiveness of the program. ◀

results of the program

In evaluating their experiences, our interns found these significant changes in their own understanding of jobs and job placement:

1. Better appreciation of industry's problems and an increased awareness of its positive contribution to community life
2. Increased realization of noncollege opportunities for capable high school graduates
3. New appreciation of opportunities for technically trained high school graduates to assist college-trained personnel
4. New knowledge for planning field trips to enrich the basic curriculum
5. Insights on job-family requirements which will improve the teaching of occupations and needed job abilities
6. Increased ability to advise on apprenticeship programs leading to skilled trades
7. Additional insights on job demands and job satisfactions: duties, types of equipment, routine and varied work programs, mental application, physical exertion and accident hazards.

Mass Production in Industrial Arts

THOMAS DARRELL SPENCER

- To teach the concepts of industry to our students, in an age of automation, we must teach **mass production.**
- Mass production of **projects on the secondary level** also teaches teamwork and responsibility.
- Here is a **practical approach** to teaching mass production with a committee system.

Our school system is often accused of being guilty of an educational lag of seven years. Essentially this means that it takes teachers and educators seven years to find out what is going on in the world and to determine if it is suitable for or worthy of our curriculum. Let us hope that whoever came to this conclusion does not try to calculate the educational lag in industrial arts. Eli Whitney would surely be proud of the few progressive teachers who are taking definite steps in teaching the concepts of mass production which he introduced in 1798.[1]

Seriously speaking, we are over a century behind. The Industrial Revolution started about 1750 and ended about 1850.[2] One century later, a few industrial-arts teachers devoted a small portion of their manipulative work to mass production.

Beg your pardon, Sir, did I understand you to say, "I can teach the concepts of mass production through related information"? I would say you have forgotten the uniqueness of industrial arts. We are unique in that we have a complete laboratory in which to be doers in addition to being hearers and readers.

[1]Jamison, Charles L., "Industrial Techniques." *Colliers Encyclopedia*, 1954, X, 575.
[2]*Ibid., op. cit.*, p. 575.

Mass Production Before Automation

We are well into the age of the Second Industrial Revolution — the Age of Automation. Will it be possible to teach automation to students who do not understand mass production? This would be like trying to explain artificial insemination to a five-year-old who does not yet know about the "birds and the bees."

To be completely realistic, we have a long way to go. If we are going to teach the concepts of industry to modern youth, we must teach mass production. Individual projects are a steppingstone to mass production projects. Projects are not a means in themselves, but a technique of teaching understanding.

How practical is mass production on the secondary level? Many articles have been written by teachers on this subject and all are bubbling over with enthusiasm. The only teachers who were disappointed are the few that did not take a few minutes to profit from the experience and knowledge of teachers who had already tried this technique.

Three Committees

A production job is an excellent opportunity to teach democracy, teamwork, and responsibility. The ideal situation is to maneuver the students into suggesting a production job after studying mass production. Here is where a real understanding of industry starts. The class should be divided into three committees corresponding to the three basic divisions used by industry — engineering, production, and business. Committee chairmen should be elected to guide each committee. A suggested organization with the responsibilities of each committee is as follows:[3]

Committee I — Engineering
- Design
- Facilities
- Materials
- Number to be Produced

Committee II — Production
- Skills

[3]Keane, George R., "Problems and Issues in Industrial Arts Teacher Education," *Yearbook V*, American Council on Industrial Arts Teacher Education, 1956, p. 138.

Mr. Spencer is a teacher of industrial arts, Josephus Daniels Junior High School at Raleigh, North Carolina.

Production Schedule
Job Schedule
Preliminary Work
Sub-Contracting

Committee III — Business

Financing
Usefulness
Market Value
Costs
Sales

Time must be alloted during class for these committee meetings. The leadership on the part of the teacher is very important here. If he sees a committee is not able to solve its problems, he must lead them to a solution. Of utmost importance is the selection of the project. This initial step may well determine the success or failure of your program.

Project Criteria

The following criteria should be kept in mind.[4]

1. The finished project should have commercial value.
2. The production run should be finished in one period with adequate time remaining for an evaluation and cleanup.
3. Tooling should be involved. This tooling should be simple enough to be done by the students.
4. The project should involve about 12–18 operations, all requiring about the same length of time.
5. The project should permit a relatively long run so the students can become proficient in their jobs.
6. The cost should be within every student's ability to pay.

Along with the above criteria, it is advisable to choose for the first job a simple project with a good chance of being a success. As the students and teacher become experienced, more complex jobs can be chosen. Beware of bottlenecks! A carefully selected project may have one operation which triples the production time and leaves 95 per cent of the class without a job. Sanding, welding, and finishing are examples of operations which must be planned carefully.

The engineering committee is responsible for the jigs, procuring materials and deciding on the number to be produced. The jigs create a genuine situation for problem solving. While the students may need some leadership, it is amazing what they can do on their own if properly inspired. In most cases, it is best to make jigs rather than use machines if the jigs are faster or require fewer operations.

A better understanding of the industry will be accomplished if the students buy their materials on the open market rather than from the shop supply. This gives them experience in competitive buying. The number to be produced must be decided in conjunction with the business committee. It is desirable to make extras to sell if possible.

The production committee is responsible for determining the production schedule. There is a tendency to get more done if each committee and individual has a deadline to meet. The job schedule is an important responsibility of the production committee. This consists of breaking the operations down into jobs and making assignments. One class filled out job application forms similar to those in industry.

In many cases, it is necessary to subcontract a part of the job to another class or to a local industry. For instance, a metal class may need to subcontract a wooden component to a woodworking class or a mill.

The Trial Run

The trial run is a phase of the mass production job which cannot be overemphasized. Every job, regardless of how well planned, is apt to have some fallacy. After all jigs seem to be in good working order, all materials are available, and all work stations are filled with competent workers, run about eight projects through the production line. Don't be surprised if you find you have "bugs" to be ironed out; in fact, if you don't, keep it quiet because industry is looking for men like you! The important thing is not whether you have "bugs" or not, but whether or not you iron them out. Students are not overly distressed if a trial run is a failure, but they are usually frustrated and discouraged if the production run fails. A good situation is to have the trial run at the beginning of the period one day and the production run later. Always leave time after the trial run to evaluate the work and search diligently for something wrong. The other extreme is to say, "Let us run five for a trial run and if nothing goes wrong, we will continue with the production run." In this situation, there is a subconscious effort to overlook anything wrong.

The Production Run

The production run is the highlight of the project. Everyone is tense and feels strongly the necessity to hurry. This is a real danger. In their haste, quality is often sacrificed for speed. Station inspectors with definite standards all along the production line. If standards are not met, a halt should be called to iron out the problem. The teacher should move around freely during the production run. In a matter of five or ten minutes, many dollars worth of material can be transformed into projects of which neither you nor the students will be proud.

Immediately following the production, students and teacher should return to the classroom for a critique. This period of evaluation is to discuss any shortcomings, errors, or bugs not found during the trial run.

The business committee has many chances to relate the production run to industry. Purchasing the materials on the open market can be a meaningful experience. The business committee is responsible for keeping the time cards for all the workers. Wages must be assigned to the various jobs and after the production run, the finance committee should prepare a financial report on the cost of the project. Since the cost of labor and materials for the construction of the jigs will make the price of only a few projects exorbitant, the business committee should figure the cost of the projects assuming that 1000, 10,000, and 100,000 were made. The financial report can be used very effectively to show how mass production reduces the cost of an article to a fraction of the cost of a handmade article.

Another meaningful experience is to have members of the business committee visit dime stores, gift shops, or other appropriate places where the project might be sold. The manager or purchasing agent at these stores will usually be glad to discuss the project with the student in terms of retail value, wholesale value, usefulness, and saleability. Often the students can find a merchant who will offer to buy the projects or sell them for the class. Mother and dad, as well as son, will be greatly impressed when junior comes home declaring himself an industrialist with a nickle profit clutched in his little hand.

Imagination Needed

This article has provided the framework. Use your imagination — go all out with this idea. Give a little imaginative thought to such industrial considerations as wages, labor unions, rent, depreciation, taxes, utilities, workmen's compensation, advertising, capital, interest rates, stocks and bonds, packing problems, shipping problems, foreign market competition, insurance, etc. Just keep on thinking! An entire year's work can be built around a good mass production job. ◀

[4]Wolf, Lloyd, and Wallace, Toby, "The Line Production Job in Industrial Arts Teaching," *Industrial Arts Teacher*, XVI (Nov.–Dec., 1956), p. 9.

▶ a checklist of hints on achieving —

Discipline in the Shop

GEORGE V. CARDINALE

The best time to establish good behavior by the industrial-arts shop teacher is at the beginning of the school term. It is much more difficult to "break" poor behavior habits than it is to prevent them. "An ounce of prevention — " most certainly applies to this school problem.

For the shop teacher, here are some general rules which have been recorded, tried, and proved in the junior high school shop. I believe for the most part they may be applied to most school shop situations:

On Organizing the Class

Have each pupil assigned to a particular place to which he must report *immediately* upon entering the shop. This is the first discipline "grip" you apply to the pupil, so make it a firm one.

If time permits, greet each boy cheerfully. Be careful here that your pupil does not in return become too "cheerful." He must always be aware of the fact that you are to be fully respected as teacher and elder.

Have *all* pupils seated while you organize the group. Experiment with the foreman and delegate a system. Use the method best carried out by your particular group.

Have a pupil check attendance and supervise his work closely.

Punish late-comers by having them report after school hours for five minutes for as many days as you deem necessary to teach the lesson of promptness.

On Class Progress

Whenever possible, present information in the form of a question. The question usually commands attention and the answer is less likely to go unheard.

Always have the boys who are advanced help those who are not.

Never stress speed in making projects. Speed is the one thing we seem to know too well these days.

Strive to have boys attempt projects that will almost certainly be successful. Failure is a "bitter pill" for young people to "swallow" long before they have gained confidence which they sorely need.

When showing films, have pupils write down questions about the film after they have seen it. Later, present these questions to be answered on paper by all pupils.

Screen the questions so that only those worth the time are presented. This should provide a more reliable and worth-while test on the film.

Have all boys learn the names of the common tools without going into nomenclature too deeply. Those boys who do not learn must stop work until they know the names.

Always stress the fact that to work in the shop is a privilege enjoyed only by those who conform to the rules of order to the letter.

Have rules of order printed and distributed at the beginning and be certain that they are good enough to print and good enough to be carried out by teacher and pupil.

On Grading

Have boys enter own grades on a form prepared by you and supervised by you. Boys will be more aware of their grades and accomplishments.

Grade as often as possible on any phase of work that can be readily and fairly graded. After giving the grade and before revealing it to the boy have him give his own grade to be recorded.

On Cleaning and Maintenance

Assign each boy to an area for clean-up and daily inventory.

Have a specific time and signal for cleaning up the shop.

Make certain that there is plenty of time to do the job properly. Ten minutes can be given and then decreased as deemed.

Keep the shop airy and well lighted.

On Dismissal

Only those who are seated will leave.

The teacher is the only person to give the signal.

Leaving the shop "on the bell" is not permitted and is not good practice.

Those pupils not seated when the teacher gives the signal shall provide their own excuse for being late to their next class.

A follow-through contact with the teacher in charge of the next class is desirable by the shop teacher.

On Discipline Generally

Discipline is carried out first to the group, then to the individual.

Be certain that the individual knows what wrong he has done before punishing him. Have him answer and provide an explanation with your interjections of what you know to be true.

Always appeal to the pupil's defense before deciding on the punishment.

Have boys who break rules of order record their name, date, and the rules broken, and keep this on file. This is to be used by the shop teacher only to present to the pupil as means of curbing.

Physical contact between pupil and teacher is only the last resort in good disciplinary action.

The above points have been presented as references rather than as a system to be followed by the new shop teacher. Each situation demands its own particular method. Each teacher must find his own means of carrying out his program. ◀

Mr. Cardinale is an instructor of woodworking at Roosevelt Junior High School in Erie, Pa.

A New Look for Industrial Education Orientation

A. C. ALEXANDER

- Many industrial education students have come to believe that **only hands** and not brains are important.
- **A revitalized orientation course** can impress the professional character of the ia-ve field.

With the ever increasing need for and popularity of "orientation" courses in our colleges throughout the nation, there seems a need for developing — or at least re-focusing — the content of the one-hour-per-week, one-semester "get together" of the "new" students in industrial education with their orientation instructor.

Why? Because somewhere along the adjustment path (and we use the term "adjustment" hesitatingly), it is becoming more and more apparent that in teaching the industrial education student about "how to get along in your new environment," we have failed to orient him to the fact that industrial education is no place for the "slow learner" and/or the "average" student.

How did we come to this conclusion? We were shocked into this realization as more and more new students enrolled in our industrial education course, orientation, and revealed that:

"I don't see any need for Algebra and Trig."

"What good will English do me? All my employer will want to know is, 'Can you do this job or that!', and he's going to rate me on performance."

"What good is mechanical drawing? I don't want to be a draftsman!"

"Do you want me to believe that History is important in my field — Automotive Science?"

Brains and Hands Needed

Such questions and statements as the foregoing are a revelation to both students and instructors. There is revealed to the instructor that the industrial education student has been "brainwashed" into feeling that his hands, only, are important to his future success. Unfortunately, many of us — as instructors — have revealed to the student that we sympathize with his feelings, and can see no justification for History, communication skills, higher mathematics, etc., in his becoming a worthwhile, contributing member to the field(s) of industrial education.

These revelations are startling in view of outmoded orientation content. Gone is the day (if one ever existed) when an hour should be given over to discussing, "How to get along in the dormitory." Orientation Week activities should take care of this. Needless, too, is a one-semester course dealing primarily with "Adjustment to College," when college life requires no end of constant *readjustment*. The thinking, probing, questioning, intellectual curiosity of the industrial education student should never be "adjusted." Our failures to succeed in many outer-space launching attempts attest to this. The demand for technically trained personnel to free our engineers from the technicians' task attest to this.

Another frightening revelation is also inherent:

We, as counselors and guidance personnel in secondary schools, have failed to point out the requirements necessary for succeeding in industrial education curriculums at college and university levels. We disregarded helping our high school pupils to be aware of the bases of industrial education — mathematics, science(s), and communication skills. We permitted the pupil to "elect" not to include Algebra, Trigonometry, Physics, Chemistry, etc., in his "units" of study. We deluded him into believing — or unshakably assuming — that manual skills without theoretical background were the essence of industrial education.

The New Look in Orientation

These are revelations which are now being unconsciously exposed by the freshman industrial education student as he innocently reacts in his "Orientation to Industrial Education" course. Moreover, as such concepts as industrial education, mechanization, automation, cybernetics, blue-collar worker, etc., become a part of a relatively inclusive orientation course, the new student's perplexity mounts to the point of compulsory tension-outbursts:

"Why didn't someone warn me about what Orientation really included!"

"*They* told me, 'Orientation was a sop!' "

"Why can't this be a two-semester course?"

After 18 weeks — only 18 hours — the instructor becomes aware of a "new look" in his industrial education students — a look that signifies pride in their chosen curriculum; a dignity that bespeaks identification with a first-class professional area which demands as much (if not more) brainwork as it does handwork; a poise engendered by familiarity with Secretary of Labor Mitchell's stirring article, in the July, 1958, *Reader's Digest*, "Help Wanted: Skilled Blue-Collar Workers."

It is this "new look" perceived by the instructor with regard to his students that is a revelation: a heart-warming recognition that his industrial education orientation course was a reciprocally revealing experience for his freshman and for him.

Mr. Alexander teaches in the division of Industrial education of St. Philips College, San Antonio, Texas.

- A current **boating "craze"** has opened up a new area in advanced woodworking.
- Here is a **brief report** on one such experiment.

Instructor Orland Killin, who initiated boatbuilding classes at Eastern Washington College, is shown with three of the 70 boats built by his students.

Boatbuilding Classes

W. R. DELL
Cheney, Wash.

Boatbuilding classes at Eastern Washington college, Cheney, have grown out of one building and are now threatening to expand out of their newer and larger quarters.

The classes, taught by Orland Killin, a native of this Northwest area, have attracted students in such numbers that enrollment has to be limited by building space available.

In the past five years Killin's classes have built nearly 70 boats ranging from eight-foot prams to 18-foot cabin cruisers. A list of the types of boats built reads like a small craft catalogue. Construction has included marine plywood, Fiberglas, and Fiberglas over plywood.

In plywood students have built 10-foot hydroplanes, canoes up to 16 ft., utility runabouts from 12 ft. to 16 ft., and prams from eight to 10 ft. Fiberglas boats have ranged from 10 ft. to 16 ft. and the largest ever built was an 18-ft. cabin cruiser.

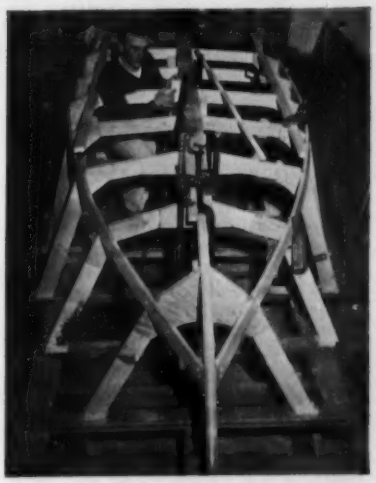
Often two or three students work on the same boat. One student ordinarily buys all of the materials and the others assist him while learning the techniques. And those helpers have invariably built their own boats at a later time, generally as soon as they can afford the materials.

The boatbuilding students at Eastern Washington college are able to make a considerable saving, approximately half the retail costs. Plywood boats, for instance, cost the student from $35 for the smallest to $140 for the largest built in the classes. Fiberglas craft cost from $125 for the 10-ft. models to $600 for the 16-ft. The costs on the Fiberglas boats include windshields, hardware, interior paint and trim.

The larger boats are seldom completed in a quarter, but the major work is done and all that is left is the finishing — hardware, trim, steering gear, and upholstery. The school allows the students, if they wish, to keep the Fiberglas boats in the shop to finish them during spare hours. Since few students have a place to park a 16-ft. boat, the shop almost always has a boat or two.

No prefabricated boat kits are used in the class. Boats are worked up from rough stock. Alaska cedar is used for the frames because of the lasting quality. "It's light enough and eliminates dry rot," according to Killin.

Marine plywood, ¼ in., is used for the hulls of the wood boats up to 16-ft. For the Fiberglas construction, the students use molds from an area boat manufacturer. Firm officials have expressed themselves as "delighted" at the opportunity to be of aid in the boatbuilding programs at the college.



Above: a student working on the frame of a 16-foot inboard. Below: two students shelling a 12-foot plywood sports runabout.

IA/VE
projects / problems

A MODERN BEDSIDE TABLE

JOHN W. HAMPTON
Dallas, Texas

This lovely bedside table is one of a pair built by a college student who had no previous experience in furniture or cabinetmaking. The design combines the modern lines, features, and construction found in today's most exclusive and expensive furniture. Plans for a dresser, chest, and bookcase headboard bed to match this bedside table will be found in forthcoming issues of this magazine.

The bedside table described is built of white oak, and has a limed-oak finish. The time required to construct this bedside table should be around 24 working hours, and it is surprising how inexpensively it can be built.

Procedure

1. Choose the side of the top that will be the top surface. Through the center of the bottom surface cut a ¼- by ¾-in. hidden dado, parallel to the ends, ending it ¼ in. from the front edge. A ¼ by ¾-in. rabbet is cut, to within ¼ in. of each end, along the underside of the back edge to allow the back to be inset.

2. Repeat the procedure above for the lower top, only this time cut the rabbet and dado on the surface chosen to be on top. On this surface the dado should be only 8 in. long, measured from the back edge of the top surface.

3. The undersurface of the lower top is dadoed ¼ by ¾ in., ¼ in. off each end, with the dados ending 1 in. from the front edge. Cut a ⅛ by ¼-in. rabbet on the underside of the back edge, ending it ¾ in. from each end. This rabbet is to allow the dust back to be inset.

4. The bottom is a frame made up of four 1 by 3-in. pieces of hardwood, with a ⅛ in. thick masonite dust panel set into it. The frame measures 1 by 16 by 18 in. Each corner is a miter joint, reinforced with dowels. The inside edges of the frame are dadoed ⅛ by ¼ in. for the 12½ by 10½-in. masonite dust bottom to be inserted. The top of the masonite insert should be ¼ in. below the top surface of the bottom.

5. Assemble the bottom. Be sure the bottom is square before the glued joints set.

6. After the glue has set on the bottom, repeat step three, only this time make the cuts on what is to be the top surface of the bottom.

7. Choose the surfaces of the sides to be used for the outside surface. Along the rear edge of the inside surface a ⅛ by ¼-in. rabbet is cut the full length of the edge. This rabbet will allow the dust back to be inset.

8. Square the back. Cut a ¾ by ¼-in. notch out of each corner, which will allow the back to be inset and the rabbet joints to be hidden on the sides.

9. The divider is an odd shaped part. The top is 9¼ in., the back side is 9¾ in., and the bottom is 7½ in. The front side is an angular edge as shown.

10. The base is as shown. The joints are double mitered, and reinforced with glue blocks.

11. Saw kerfs spaced ¾ in. apart make up the drawer front design.

12. Drawer construction may be as shown, or of your own choosing.

13. Drawer center guide construction is as shown.

Assembly Procedure

1. The job of finishing the bedside table is made much simpler if all parts are well sanded before the bedside table is assembled.

2. It is best to assemble the base first. Due to the mitered joints and the slanted sides, glue blocks, reinforced with flat head wood screws, should be used on the inside of each joint and on the back ends of each side.

3. The remainder of the cabinet is assembled at one time, beginning by gluing the bottom, sides, and lower top together and then adding the divider, back, and top. Flat head wood screws may be used in unexposed surfaces to reinforce the joints, but they are not necessary.

5. When the cabinet and base have thoroughly dried, the base is glued onto the frame of the bottom member of the cabinet.

6. The drawer assembly procedure is practically self-explanatory. Assembly is easiest by gluing the sides to the front, then adding the bottom, and gluing the back on last.

7. After the drawer has set, the ¼ by 1 by 14-in. center guide is glued and screwed on the bottom of the drawer.

8. After making sure of the drawer fit, glue the dadoed center drawer guide in the bottom of the cabinet. Before the glue sets, insert the drawer, lining it up while the glue is still wet. Leave the drawer in the cabinet until the glue has set.

9. The masonite dust back may be nailed, glued, or attached with screws to the back of the cabinet.

10. Before starting the finishing pro-

BILL OF MATERIALS

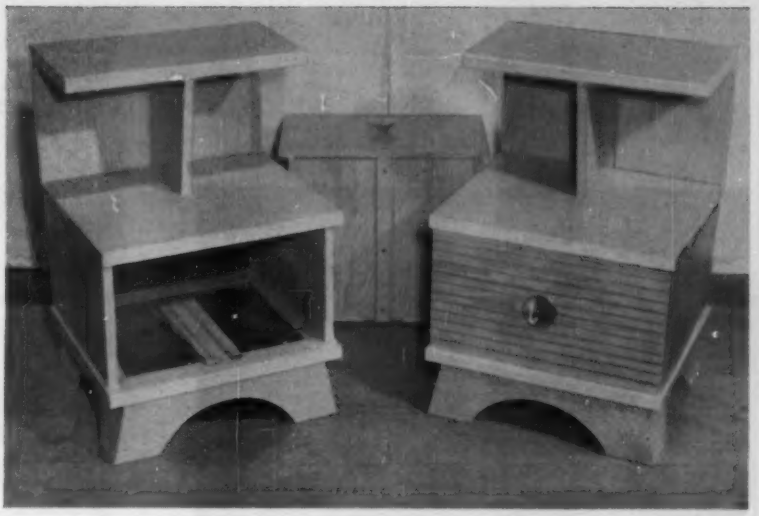
Quantity	*Part*	*Material*	*Size*
1	Top	White oak	1 x 10 x 18
1	Lower top		1 x 16 x 18
2	Bottom frame		1 x 3 x 18
2	Bottom frame		1 x 3 x 16
1	Back		¾ x 9¾ x 18
1	Divider		¾ x 9¾ x 9¼
2	Sides		¾ x 9¾ x 15
1	Base (front)		¾ x 5 x 17½
2	Base (sides)		¾ x 5 x 15¾
1	Drawer front		¾ x 9¼ x 17½
2	Drawer sides	White ash	½ x 9¼ x 15
1	Drawer back		½ x 9¼ x 15¼
1	Drawer guide		¼ x 1 x 14
1	Drawer guide		½ x 2 x 14
1	Drawer bottom	Plywood	¼ x 14½ x 15½
1	Dust back	Masonite	⅛ x 9¾ x 17½
1	Dust bottom	Masonite	⅛ x 10½ x 12½
1	Knob	Brass	2¼ dia.

cedure, a hole should be drilled for the drawer pull. Since the bedside table sits so low, it is best to drill the drawer pull hole about ¾ in. above center. When viewed from a standing position the drawer pull will have the illusion of being centered.

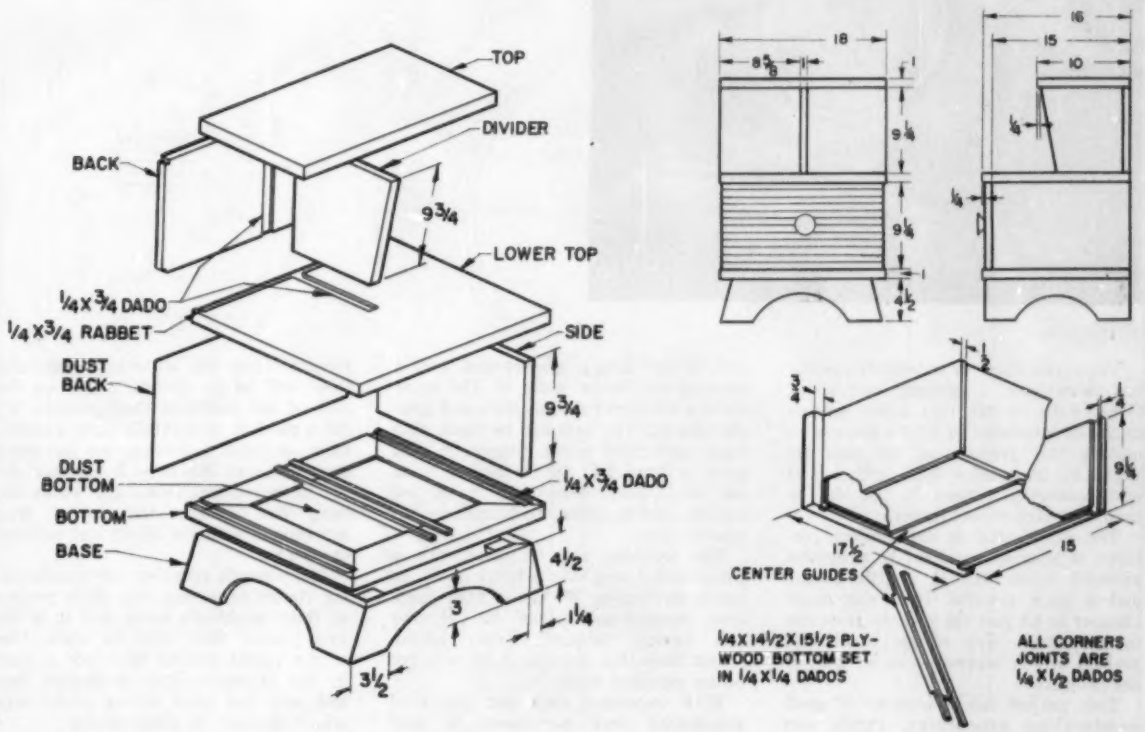
Finishing Procedure

The bedside table described has a limed oak finish, but it could have been finished many different ways. If you prefer a limed oak finish the following steps will assure you of a good finish.

1. Sand all finished surfaces well, ending with 6/0 sandpaper, making sure all scratches and chips are removed or feathered out.
2. Raise the grain at least two times to make sure all mars are removed.
3. Remove all sanding dust with an air hose and wipe the surfaces down with a clean, dry, soft cloth.
4. Apply as many coats of a good white wood filler as necessary or desired.
5. After the wood filler has dried thoroughly, sand all surfaces very lightly with very fine steel wool, and again clean surfaces with an air hose and a soft clean cloth.
6. In order to be extra sure that the wood filler won't turn yellow, water-white lacquer should be used for finishing.
7. Apply two or more coats of water-white sanding-sealer lacquer, rubbing to a smooth finish between each coat with fine steel wool.
8. Before applying the finishing lacquer, be sure the final coat of sanding-sealer lacquer has thoroughly dried, and has been rubbed to a glass-smooth finish with steel wool.



9. Apply four or more coats of water-white finishing lacquer. The thinner and more coats applied, the better the finished surface will be. Between each or every other coat of finishing lacquer, the surfaces should again be rubbed down with very fine steel wool.
10. After the final coat has been applied, rub the surfaces down again with very fine steel wool. Rub the finished surface vigorously with clean soft toweling or cheese cloth. If you have been careful in the above steps a mirror-like surface will be had.
11. A good furniture wax or automobile paste wax will give the finish a lasting mirror likeness.



TILTING CLOCK OR BAROMETER

FRED E. JESKA
Paris Gibson Junior High School
Great Falls, Mont.

The tilting clock or barometer project has been such a popular success in Great Falls classes that other schools might be interested in it. We have been making this project for the past six years in the junior high school and adult education classes. It can also be used as a high school project.

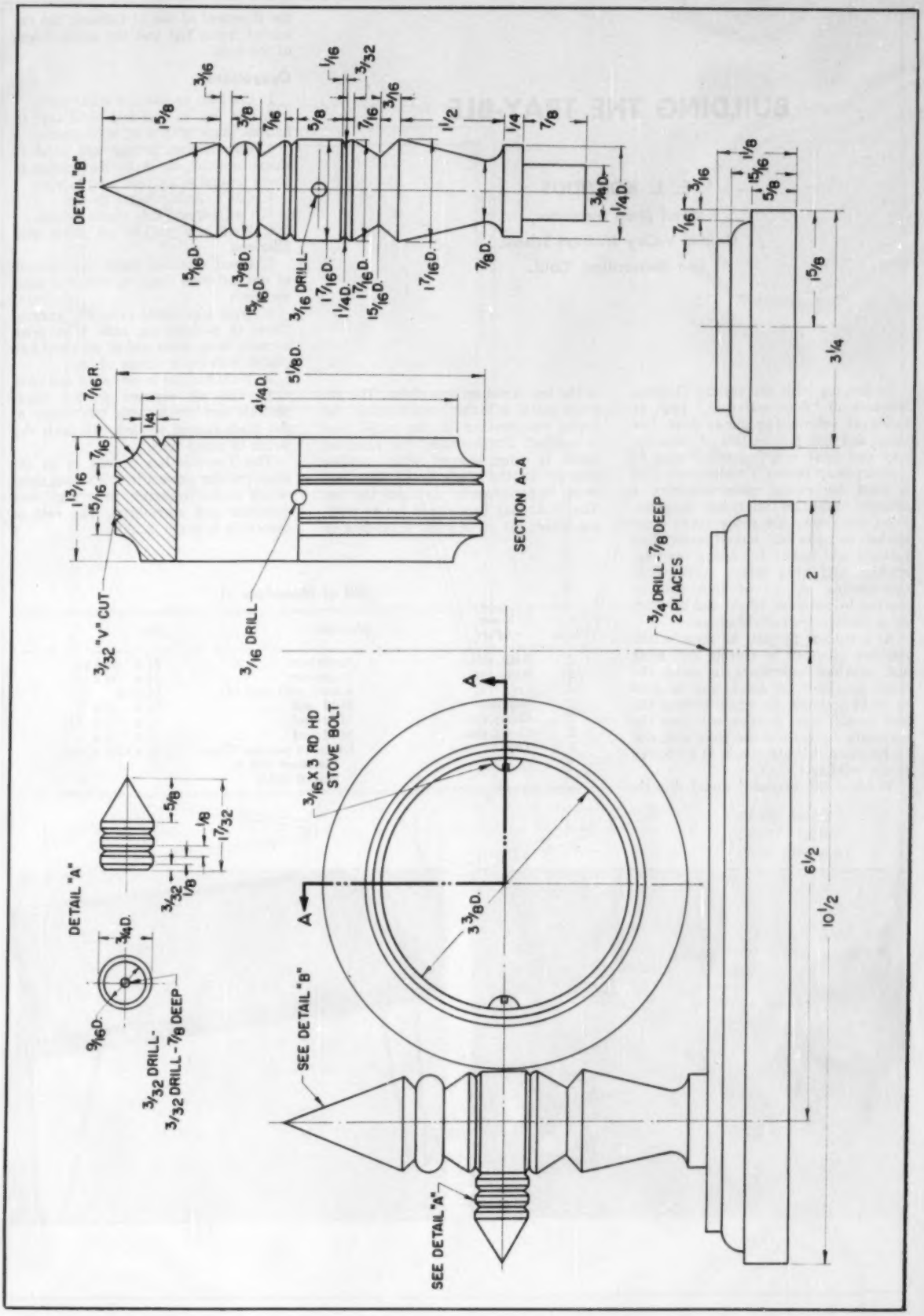
The wood used in the project pictured is Montana juniper. It resembles aromatic cedar, but is a little harder and is more colorful. It is also much cheaper as we just cut it down from the mountainsides. Any of the beautifully grained woods, however, can be used in the project.

This project has a number of good woodworking experiences. Pupils can look at the sample project and with a drawing can easily make it. The wood turning involves both faceplate and spindle turning. The base can be made with hand tools and power shaper. A drill press or hand drill can be used to make the small holes needed. A 5/16-in. tap can be used to make the threads in the wooden nuts.

The finishing can be done with a brush and if you have a spray outfit, so much the better. We use a high gloss, clear lacquer with about 40 per cent fast drying, lacquer thinner added. About four thin sprayed coats will put on an excellent finish.

It is important that you put good guaranteed clock movements in your project. They will last many years and there will be no dissatisfaction on the part of the pupils or their parents. To get a good fit, you should have a movement on hand so you can get the exact measurements. We have found that the 3½-in. movement looks and works the best. We use just the electric type movements with the alarm and without the alarm.

Many pupils entering our woodworking classes have seen this clock project at their neighbor's home and it is the first project they want to make. One of my pupils entered his clock project in the Montana State Industrial Fair and won first place in the junior high school division in woodworking.


DETAIL "B"
SECTION A-A
DETAIL "A"
SEE DETAIL "B"
SEE DETAIL "A"
3/16 X 3 RD HD STOVE BOLT
3/4 DRILL - 7/8 DEEP 2 PLACES
3/32 "V" CUT
3/16 DRILL
3/32 DRILL - 3/32 DRILL - 7/8 DEEP
3 3/8 D.
5 1/8 D.
4 1/4 D.
7/16 R.
1 13/16
1 5/16
7/16
1 1/4
3/4 D.
9/16 D.
5/8
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1 7/32
3/32
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2
6 1/2
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3 1/4
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BUILDING THE TRAY-BLE

E. L. KORZILIUS
Metal Shop Instructor,
Golden Valley Jr. High School,
San Bernardino, Calif.

In keeping with the current Oriental influence of "floor activities," such as eating or entertaining guests from low tables and floor pillows, this combination tray and table will find many uses in contemporary homes. Children will find it ideal for eating while watching a favorite mealtime television program. Food and drinks are easily taken from kitchen to patio and served intact. Bed patients will use it for eating, writing, reading, and even hobby work while convalescing. A set of four can be stacked to end-table height and be readily accessible for individual use.

As a student project, its construction requires accuracy in cutting and filing and provides experience in using the scroll die. Four fire bricks can be used to build a simple jig when welding the legs to the rails. Brazing will give the necessary strength to the piece and, due to its more delicate touch, is preferred to arc welding.

Welding the extended metal directly to the top is not recommended. The 16-gauge metal is easily burned before the fusing temperature of the angle iron is reached. Furthermore, the extended metal is often warped while welding directly to the angle iron. This will result in permanently springing the top. The cleats may be clamped before welding, either flat or on edge, depending on the closeness of the fit between the extended metal top and the inside edges of the rails.

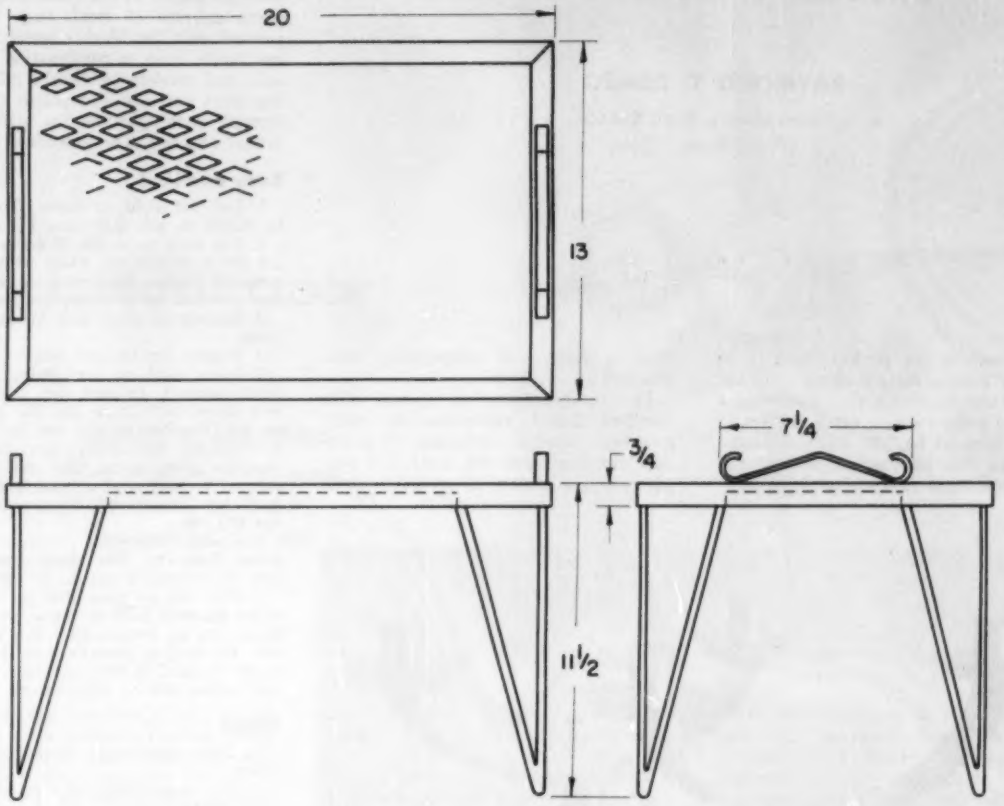
Operations

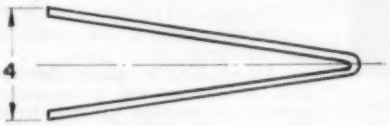
1. Cut rails to size and miter ends.
2. Cut legs to size and bend cold to hairpin shape with 4 in. across ends.
3. Cut handles to size and bend to shape in scroll die or by hammering to shape around ¾-in. pipe held in vise.
4. Cut extended metal to size.
5. Cut end and side cleats to size.
6. Weld rails and fill all joints with filler rod.
7. Insert extended metal in underside of top and weld cleats in center of sides and ends.
8. Weld legs inside rails. Use ends of cleats to position leg ends 3 in. from corners. Bent lower end of leg should be plumb with outer corner of top.
9. Weld handles in center of end rails.
10. File all exposed welded joints smooth and finish with two coats of flat black enamel applied with fairly dry brush to avoid runs.

The Tray-ble has proved to be the most popular project in this school shop, which works frequently in wrought-iron furniture and accessories. The cost of materials is under $2.00. ◀

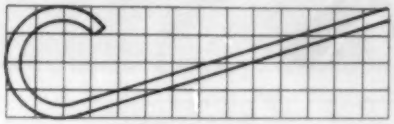
Bill of Materials

No. of Pieces	*Name of Part*	*Material*	*Size*
2	Rails, side	Angle iron	¾ x ¾ x 20
2	Rails, end	Angle iron	¾ x ¾ x 13
4	Legs	Round mild steel rod	¼ x 24
2	Handles	Mild steel	⅛ x ½ x 9
2	Cleats, end	Mild steel	⅛ x ½ x 3⅛
2	Cleats, side	Mild steel	⅛ x ½ x 6⅞
1	Top	Diamond pattern 16-ga. Flattened and extended metal	½ x 12¾ x 19¾



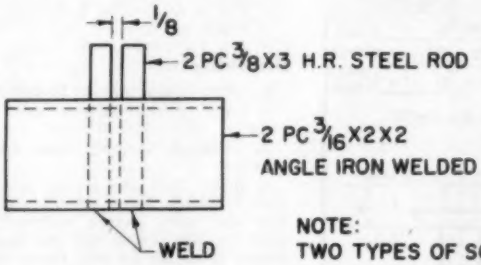


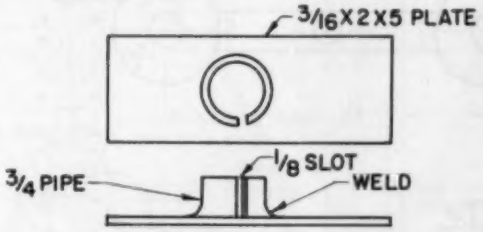
LEG DETAIL



HANDLE DETAIL
1/4 SQUARES

BEND ENDS
FIRST - BEND
CENTER LAST





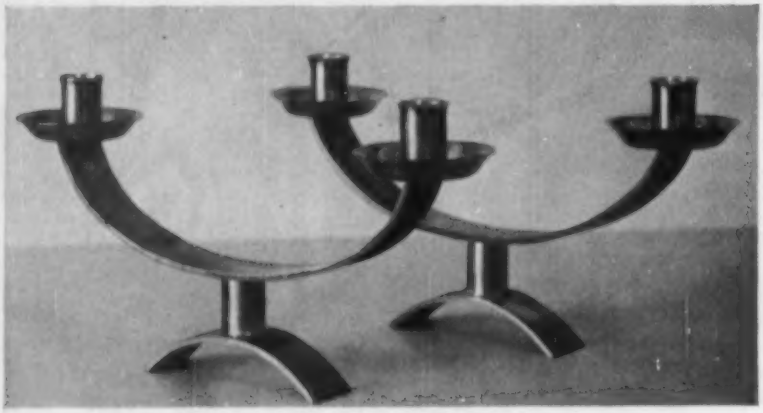
NOTE:
TWO TYPES OF SCROLL DIES TO BE USED IN BENCH VISE.

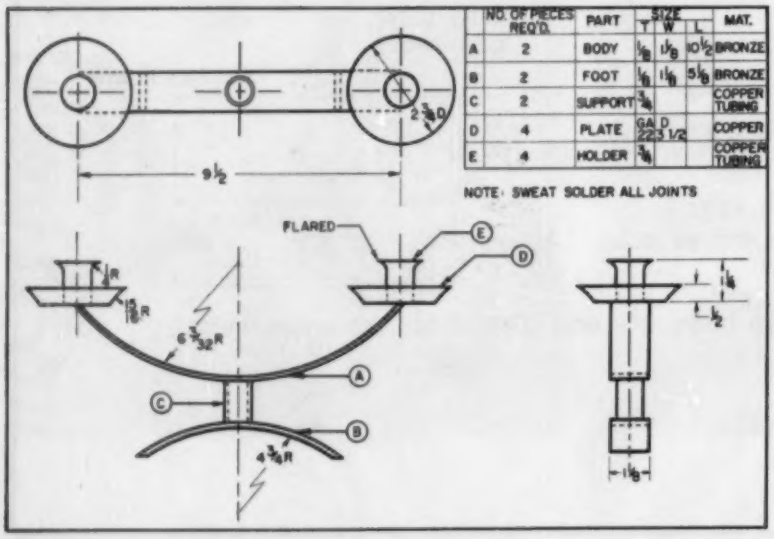
BRONZE CANDLEHOLDERS

RAYMOND T. DEMEO
Glastonbury High School,
Glastonbury, Conn.

In searching for project ideas to fit into our general metalworking program, one student located a photograph of a group of prize-winning candleholders in a back issue of IA/VE. From the basic forms in the photograph several full scale sketches were made until the most pleasing form and proportions were obtained.

The candleholders, as shown, offer excellent initial experience in metal spinning. Possible variations of materials are band iron for body and supports, and a variety of available sheet stock shorts for the plate and holder. The plate can be hammered to shape if metal spinning facilities are not available. The holder and support can be formed from the flat with locked or soldered seams. If the candleholders are made entirely of steel, they may be painted with flat black enamel; if they are made from a combination of ferrous and nonferrous metals, paint only the steel portions and polish the nonferrous metal portions to achieve excellent contrast. The procedure follows:





	NO. OF PIECES REQ'D.	PART	SIZE T	W	L	MAT.
A	2	BODY	1/8	1 1/8	10 1/2	BRONZE
B	2	FOOT	1/8	1 1/8	5 1/8	BRONZE
C	2	SUPPORT	3/8			COPPER TUBING
D	4	PLATE	GA 22	D 3 1/2		COPPER
E	4	HOLDER	3/8			COPPER TUBING

NOTE: SWEAT SOLDER ALL JOINTS

Body and Foot

1. Lay out radii on paper. These may be varied to suit individual tastes.
2. Cut stock to length. If desired widths are not available, cut wider widths using a metal cutting band saw or a slitting saw mounted on a milling machine arbor.
3. Smooth all edges with file and emery cloth.
4. Planish top surfaces only.
5. Form radii on anvil using a plastic faced hammer; or omit step 4 and hammer pieces into shape like the craftsman of old. Excellent results can be obtained by heating the metal and passing it through sheet metal slip rolls. If this method is used, start a bend in the metal first. An assistant will be needed to turn the slip roll.
6. Check radii with original made on paper (step 1). Any slight irregularities may be hammered out on an anvil.
7. File flats on ends. Rub the metal on a flat file or a sheet of coarse emery cloth to remove any irregularities. It is important that the faces of these ends are parallel to a flat surface. If they are not, the plate and holder will be tilted on the body.

Plates

1. Turn hardwood chuck to desired shape.
2. Cut copper disks with metal snips or circle shears.
3. Spin, trim, and polish.

Holders

1. Cut tubing to length.
2. Mount tubing in a universal chuck; face and polish.
3. Flare tubing by placing the ball end of a ball peen hammer in the tubing and tapping with another hammer. Be gentle. Keep revolving the tubing while tapping.

Supports

1. Cut to length.
2. File to fit radii of body and base.
3. Polish on lathe.

Assembly

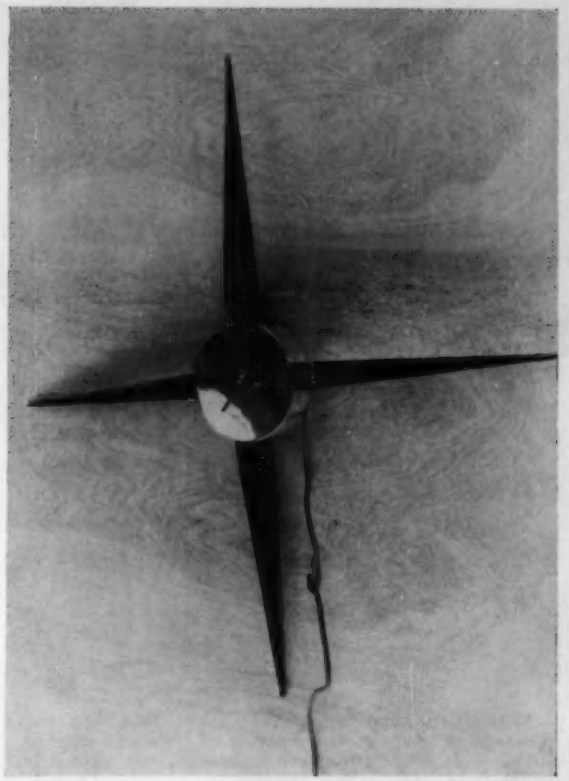
1. Sweat solder support to foot.
2. Sweat solder support and foot to body.
3. Center holders to plates and sweat solder.
4. Invert unit and sweat solder body ends to plates. Note: Carefully clean and flux all joints before soldering. When soldering the tubing, get the wire solder inside the tubing for neat joints. Place wet paper towels around previously soldered joints as the soldering operations progress.

Finishing

1. Clean in pickling bath of three (3) parts water to one (1) part sulphuric acid. When mixing be sure to pour the acid in the water.
2. Polish with No. 00 steel wool.
3. Spray with clear lacquer.

SUNBURST CLOCK

ELMER B. MATTSON
Industrial Arts Instructor,
Hoover Elem. School,
Redwood City, Calif.



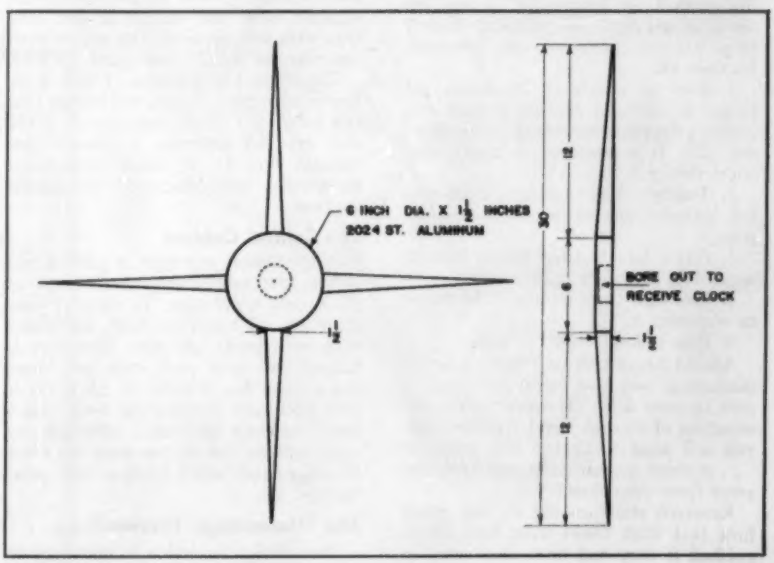
This project, combining 2024 aluminum and wood, produces an interesting, creative sunburst clock. The clock face is made of 2024 aluminum, 1½ in. in thickness. The material is of plate stock and can be formed in several ways. If an engine lathe is available, the process of turning the bandsawed clock face to a 6-in. diameter is an easy task. With a boring bar, the inner diameter hole is turned to receive the clock mechanism. The average clock mechanism is 3 in. in diameter.

If a lathe is not available, as was not in this particular case, this procedure is followed. The clock face was bandsawed from the flat plate stock to general size. Using an electric floor model belt sander, the clock face was gently rotated until a round diameter was obtained. The inner hole was a series of holes until a roughed out area of 3 in. in diameter was formed. Once this inner recess has been formed, the hole is roughly formed. Since neatness at this point doesn't really matter, as this side is not seen, neat appearance is unnecessary. The inner recess should be 1⅜ in. deep, or ⅛-in. wall in thickness.

The arms of the sunburst clock are made of wood 1½ in. in thickness. The length should be approximately 12 in. Mark the tapering sides on the wood and bandsaw the three tapering sides, leaving the backside flat as indicated in the drawing. To smooth the tapered cuts, sand on an electric belt sander or file to smooth finish.

Method of attaching the arms to the clock can vary. Using a rectangular bracket, attach small bracket with wood screws to base of the arms. Then by taping 4–40 threads to backside of the clock, use machine screws for final assembly. For greater strength, add a pin or a dowel set-up as a locking device. Assemble with brackets for a sure fit.

The final finish can be a buffed clock face with the clock arms painted a lacquered black. Imagination is all that is needed in a project such as this. If aluminum is not available, the entire clock could be made of wood. The results would still be the same, a decorative piece for any home.



AUTOMATIC FIRE ALARM SYSTEM

ROBERT J. MOUSER
Industrial Arts Department
South Union High School
Uniontown, Pa.

Most electric shop teachers have experienced difficulty in the selection of electric shop projects for their students to construct. Most of the difficulty lies in the following facts:

1. Most electric shop projects required too much mechanical skill; they taught mechanical construction and not electricity.
2. Cost of projects was too high — commercially made products were superior and cheaper.
3. Available projects lacked "boy interest."
4. Utility of projects was questionable. They did not fill any need.

After designing and construction of this project we found that it met the needs of a simple yet practical electric shop project. Some of the favorable features are:

1. Easy to construct. Materials are simple to use and yet the project embodies a degree of electrical "know-how" and skill. It is necessary to apply electrical theory.
2. Teaches: Basic circuits, series wiring, batteries, electromagnetism, thermostats.
3. Has a lot of utility value. Fathers appreciate its safety application.
4. Has high "boy interest"; he wants to construct it.
5. Cost is low; utility is high.

An old adage tells us, "build a better mousetrap and the world will beat a path to your door." However after construction of this project I feel sure that you will want to change this adage to . . . convert a mousetrap and keep fire away from your door!

Research statistics tell us that many fires that start could have been extinguished if they had been discovered in their early stages, and that many lives would have not been lost if someone had warned the occupants sleeping in a house before the fire had gained headway. This simple alarm system will accomplish both these feats. It is simple enough and cheap enough for the average student to accomplish.

This alarm system is independent of the power lines and will function even though fire may have disrupted them.

Parts Selection and Wiring

All parts in this automatic fire alarm system are easily obtainable and many substitutions may be made. The accompanying schematic drawing shows that the system is wired in a conventional manner. Since low voltage is used, any type wire may be used. The author used the common No. 22 radio hook-up wire.

The Parts List includes: 1 bell, 4 in. low voltage type, 1 door bell button (for test button), 1 SPST main switch, 2 1½ volt dry cell batteries, a cabinet (see drawing No. 4), as many mousetraps as needed, and discarded fluorescent starters.

The Control Cabinet

While almost any type of cabinet will suffice, the author constructed one of ½-in. soft white pine. To simplify construction, all joints are butt, assembled with wire brads and glue. The door is hinged and held shut with one wood screw (size No. 8 — ¾ in. r.h.). (It is only necessary to open the door once a year to change batteries.) Although any paint will do, the author used two coats of red enamel which made a very satisfactory job.

The "Mousetrap" Thermo-Trap

Very little conversion is necessary to convert the mousetrap to a "thermo-trap." The bait pan must be removed and a copper tin strip added as an electrical contact. Wiring is very simple, being merely two strips of bell wire as indicated on the accompanying drawing. All electrical joints should be soldered. The paraffin block will hold the spring open until fire melts it and the circuit is completed to ring the alarm bell.

The "Fluorescent Light Starter" Thermo-Trap

For locations that have extremely high temperatures (such as over furnaces) the author has found that the wax, supporting the mousetrap spring, had a tendency to soften and sag. To offset this difficulty in a thermo-trap, a trap that operates on a thermostat principle has been devised. A defective fluorescent light starter (obtainable usually on a cost-free basis from local electrical shops) can be readily used due to its bimetal thermostat strip. To use this type of trap, remove the can, cut away and discard the little brown condenser (paper-waxed), and break the glass tube which will leave the bimetal strip and contact exposed and ready for action. In event of temperature rise in the vicinity of this trap, the curved bimetal strip will expand and bend over to touch the straight contact strip thus closing the circuit and ringing the bell.

Installation

The control box should be located in the bedroom clothes closet or somewhere near the sleeping area. This will enable you to be awakened in the event of temperature rise or fire. The thermo-traps may be installed anywhere that the builder feels there may be danger of fire. The author suggests such likely spots as above the furnace, above the water heater, in the coal bin, in the attic in the garage, etc.

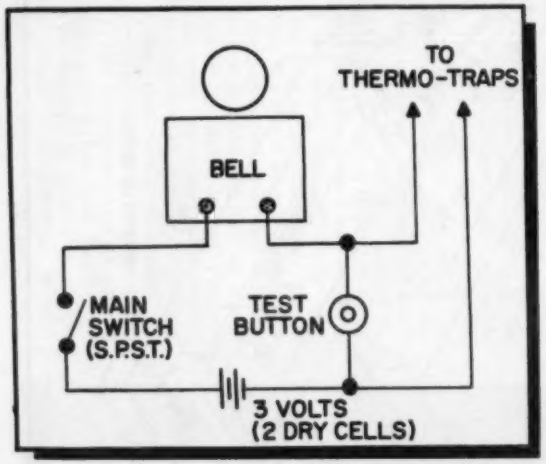
Wiring is common bell wire. It is necessary to run two wires from the control panel to the first trap, then two wires from this first trap to the second, etc. This is called wiring in a parallel. The "mousetrap thermo-traps" and the "Thermo-traps" made from fluorescent starters may be used in any combination. They may be all of one type if the construction is desired.

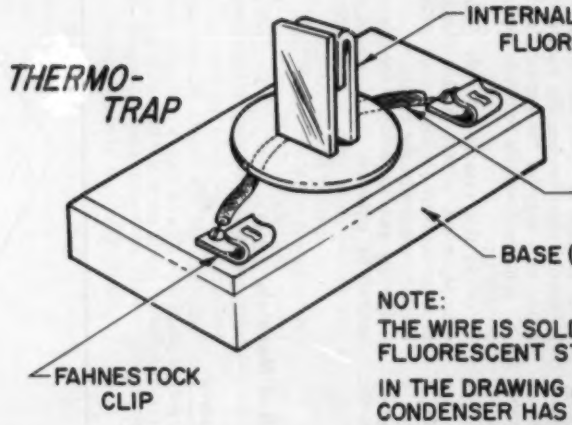
Testing

After the system is installed it may be tested by holding a match under one of the traps made from a starter. To test the "mousetrap" variety, it is merely necessary to remove the block of wax. The batteries may be tested by pushing the test button on the control panel.

Maintenance

The unit should be tested at least once a year with a match and by means of the test button. The batteries should be replaced once a year even if they show no signs of deterioration. Since the batteries are rather low in cost, it's cheap insurance that one can sleep safely without fear of fire!

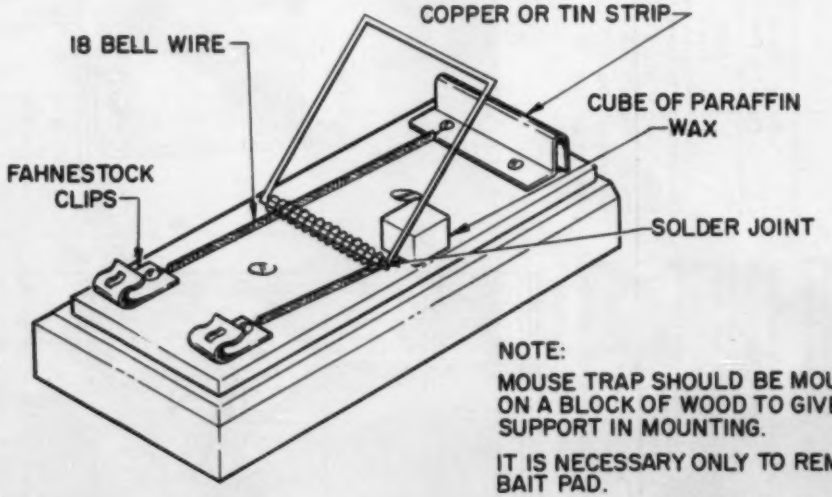




NOTE:
THE WIRE IS SOLDERED ON TO THE LUGS ON THE FLUORESCENT STARTER UNIT.

IN THE DRAWING ABOVE - THE NOISE SUPPRESSION CONDENSER HAS BEEN REMOVED.

THE BASE IS TO HAVE TWO COATS OF RED ENAMEL



THERMO-TRAP

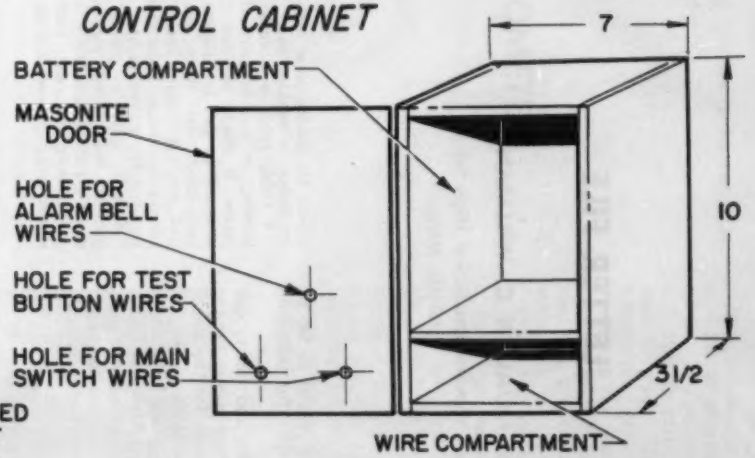
NOTE:
MOUSE TRAP SHOULD BE MOUNTED ON A BLOCK OF WOOD TO GIVE IT SUPPORT IN MOUNTING.

IT IS NECESSARY ONLY TO REMOVE BAIT PAD.

ALL WIRE CONNECTIONS ARE TO BE SOLDERED.

THE BASE IS TO HAVE TWO COATS OF RED ENAMEL.

CONTROL CABINET



NOTE:
CABINET IS MADE FROM 1/2" THICK SOFT WOOD. ALL JOINTS ARE BUTT FOR EASE OF CONSTRUCTION. THE DOOR MAY BE FASTENED BY MEANS OF WOOD SCREWS. HINGES MAY BE USED IN FASTENING DOOR TO FACILITATE BATTERY REPLACEMENT.

LETTER FILE

ALLEN C. WILLMAN

Washington Junior High School,
Duluth, Minn.

This letter file has proved to be an excellent starting project for beginning plastics instruction.

A great deal of color and variety can be added by using clear plastic for the body and colored plastic for the stand.

The design on the front of the file may be put in, using either a vibro-tool or a wood-burning set. After the design is in, the plastic can be filled with paint to add color, the only limiting factor being the young student's creativity.

Procedure

1. Secure and lay out plastic.
2. Cut plastic to correct dimensions.
3. File, sand, and polish plastic. Do this to the edges only, and with new plastic be very careful not to remove masking paper.
4. Lay out the design on tracing paper, transfer design to masking paper with carbon paper. Tracing paper can make this a very easy task; as the best results can be obtained by having the design on the inside of the body, make sure that you reverse the tracing paper before you transfer design to masking paper.
5. Using either a vibrotool or a wood burning set cut or burn the design in plastic. It should be about 1/32-in. deep, so it will be able to hold enough paint to have good color. When using a burning tool, you will notice a rough edge appears around the design. Make sure that this is removed before you paint.
6. Apply paint to design, making sure paint is well mixed, and wipe off any excess paint immediately.
7. Heat plastic and bend to desired shape. Using the bending jig will greatly simplify the shaping of the letter file.
8. Follow the same procedure for the stand.
9. Remove masking paper from all parts and clean with a soft dry cloth.
10. Place the stand on a flat, even surface, the desired distance apart; using Methelene Dichloride or another liquid plastic cement, place a small amount on the stand (top only). Place body on stand and secure in place until dry.

Bending Jig

The bending jig is best made of a close-grained hardwood — pieces of this size can usually be found in the scrap box — and sanded very smooth. The hot plastic will pick up any and all irregularities in the surface.

Pieces "A" and "B" are made of ¾-in. hardboard, and "C" is a ⅛-in. hardboard. The dowels prevent slippage and give the correct alignment each and every time.

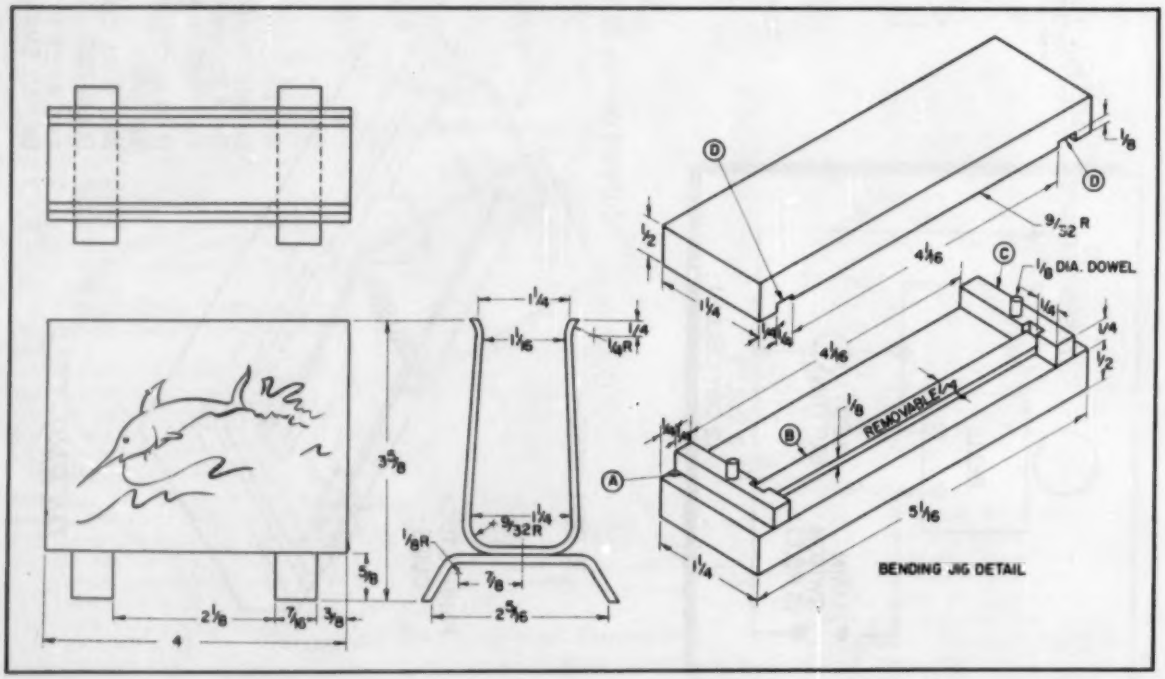
"C" is made of ⅛-in. hardboard and is inserted when bending the ends only, acting as a stop for the correct depth. "C" is made removable so not to require another jig.

"D" in this case is cut only ⅛-in. deep so as not to mar the hot plastic, as some boys are inclined to apply too much pressure with the clamp.

The jig can be held in the closed position by a clamp.

Bill of Materials

No. of Pieces	*Name of Part*	*Material*	*Size*
1	Body	Clear or colored plastic	⅜ x 4 x 7¼
2	Stand	Clear or colored plastic	⅛ x 7/16 x 2 5/16



▶ how to teach beginning drafting students to read a rule from interest —

FROM CUBIT TO MICROMETER

WALTER P. BUSCH
Instructor, Woodrow Wilson Junior
High School,
San Diego, Calif.

Even the use of an enlarged scale as a visual aid sometimes throws the pupil off and the concept of size proportion and distance makes it a most difficult area to teach. The writer asked the mathematics department of his school to assist in this important visual perception area of drafting to help pupils visualize the proportions on the ruler or scale.

Practice in measuring ¼ in., ½ in., ⅝ in. and ¾ in. on simple problems is a good start on how to read a rule. Smaller measurements and fractions thereof soon will give confidence and the pupil is on his way to understand the measurement according to the U. S. Standard. We are satisfied in junior high school to teach from cubit to micrometer but let the pupils know that accuracy within a millionth and a billionth of an inch will be possible. ◀

We should teach the beginning junior high school drafting student how to read a rule or scale from interest. The first interest may be a biblical story he may well have heard at home or Sunday school. One of these early stories may be about David and Goliath:

"And there went out a champion out of the camp of the Philistines named Goliath, of Gath, whose height was six cubits and a span." *I Samuel 17, V. 4.*

Now tell me what boy has not heard the story of David and Goliath? And what boy would not be interested in hearing how tall this man would be on our basketball floor today?

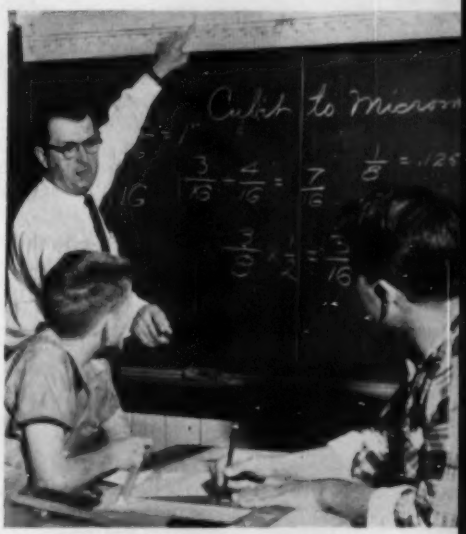
Or, we may take the story about the Ark:

"The length of the ark shall be three hundred cubits, the breadth of it fifty cubits, and the height of it thirty cubits." *Genesis 6, V. 15.*

We now have a topic with interest that is heard in the home that we may use to teach how measurement was used before the Christian era. In fact, in 6000 B.C. the first known standard, the cubit, was established in ancient Egypt. The cubit was the distance from the point of the elbow to the tip of the middle finger, roughly 18–19 inches. Go to the blackboard, therefore, and measure the height of the giant Goliath by multiplying six times 18 in. and add 9 inches for the span and you will have 9 ft. and 9 in. The pupil will have some idea of what a giant this warrior was.

With this much interest to stimulate the appetite for our next step the pupil is ready to listen to why man has always measured the world around him and he too must understand measurement. Measurement deals with *one dimension* — inches, feet, yards, miles etc.; *two dimensions* — square inches, square feet, etc.; *three dimensions* — quarts, gallons, bushels, cubic inches, cubic feet, etc.

This problem of reading a rule or scale seems to be universal in most schools and the pupil may read a scale and then shift to a wood shop where a try-square or folding rule is used or a metal shop where a flat steel rule is used and seem to be unable to make the transfer. This may go along with our concept of words in our English language where one word may mean different things according to the individual's experience.



— San Diego City Schools

A teacher and several students are shown using an enlarged scale for visual-aid demonstration of reading a scale or rule.

IA/VE
special / report

▶ the mining and processing of —

Taconite-Wondrous Ore

MERLIN MOORE

Providence was indeed kind to supply our nation with immense quantities of high-grade iron ore, but what happens when the supply dwindles? On the following pages, IA/VE presents the answer to that very important question.

Everyone knows iron ore is mined from a pit in the ground and man uses this material as the chief ingredient in the manufacture of steel. They realize that countries which have an ample supply of this natural resource have had, and no doubt will continue to have, a profound effect on world politics, economics, and leadership in times of war and peace. Nearly everyone also understands that America's enviable record of unequaled steel production, over 147

Mr. Moore is training advisor, Reserve Mining Company, Silver Bay, Minn.

In an open-pit mine, taconite is blasted loose and loaded by electric-powered shovels into 45-ton dump trucks.

— Reserve Mining Co.

million ton capacity in 1959, has been largely responsible for building the greatest industrialized civilization the world has ever known.

Transition to Mining Low-Grade Ore

Not everyone is aware however, of necessary changes which have been made in iron ore mining methods and techniques in recent years. Effects of these changes will certainly influence the lives of everyone in the United States for many years to come. Because of our reputation as a leader in the world today, these results may also affect the lives of people who inhabit other areas of the earth. The important reason is that the iron mining industry in the United States is making a transition from the mining of a high-grade ore to the mining of a low-grade ore. The processing or "beneficiation" of that "potential ore" into a desirable product on a commercial basis is a gigantic undertaking.

Therein lies an interesting and thrilling story — the story of determined and courageous men, giant machinery, fantastic sums of money, inspirational leadership, American know-how, and plain, unadulterated hard work. It is a story of twentieth century pioneering in every sense of the word, and the result is one of the great sociological, financial, and industrial developments of our time.

But perhaps we would be making a grave mistake if we were to start the story at its climax. Instead, let's open the ledger to the first chapter and discover the general setting of the story and also learn about some of the factors which have influenced the situation as we know it today. For the purpose of clarity, let us also confine the plot of the story to the world famous Mesabi Range in northeastern Minnesota — the range which has produced 85 per cent of the iron ore mined in the United States since the turn of the century.

The Story of Taconite

Taconite, the original or mother ore, was laid down by nature in the Great Lakes area many geologic ages ago. An accepted estimate is that taconite is in excess of 900 million years old. The rock is primarily dark gray in color and it is one of the hardest flint-type rocks to be found anywhere in the world.

Geologists speculate the rock was formed under a body of water which contained iron minerals and silica in solution. Apparently the minerals slowly settled and became thoroughly diffused with a much larger mass of white gelatinous silica. The two were then deposited as a single jelly-like material at the bottom of the lake. Pressure and other forces of nature changed this substance into the rock commonly referred to as "chert."

Over a period of many years the lake gradually receded and finally disappeared. Heat from numerous lava flows in northeastern Minnesota baked the chert until it was extremely hard and also recrystallized much of the iron to magnetic iron-oxide. For that reason, much of the formation is now magnetic taconite.

The iron content varies considerably with the location where taconite is found. A typical sample from the eastern Mesabi contains about 25 per cent recoverable iron. The remainder is made up largely of the silica or sand with small amounts of other minerals such as alumina, magnesium, and phosphorous.

Experts theorize that at some period in the earth's formation, movements within the earth opened up cracks at the surface. These crevices allowed water to enter. The resulting freezing, thawing, and filtering action of the water dissolved and carried away much of the sand from the original ore. The material which remained was a relatively pure substance containing a much higher percentage of natural iron.

It must be pointed out that this action took place only within certain well-defined pockets or pits within the original taconite rock. In later years this ore which nature purified became known as a direct-shipping ore because it could be used for making steel in its natural form. No further processing was necessary. These pockets of direct-shipping ore contain in excess of 50 per cent natural iron, but unfortunately they comprised only about 5 per cent of the total iron-bearing range area. Approximately 95 per cent of the Mesabi Range remains to this day as the original unchanged iron-bearing taconite rock.

A prospector named Peter Mitchell was the first white man to discover the Mesabi Range 88 years ago. Little did he realize he had located what would long be recognized as the world's principal source of iron ore. The Indians who inhabited the area knew about the red dirt for several hundred years. Apparently they were also aware of the enormity of the range for in their language the word Mesabi is defined as the word "giant." The pronunciation seems rather strange today but certainly the giant was colorfully and appropriately named.

Grades of Iron Ore

Experienced prospectors realized that all of the iron ore in the area was not of the same quality. The pockets of soft rich ore were sought out to be mined while the gray, lean, chisel-breaking taconite naturally remained behind. This practice of using only the cream of the crop was to continue for many years. During this time our nation was to engage in two world wars and periods of great industrial expansion. The pick and shovel, long recognized as the basic tools of the trade, were replaced by steam engines and steel railroad cars. They in turn were outdated by the Diesel engine and the dump truck. Expensive underground mines were often discontinued in favor of the open pit method of mining as modern methods of transportation made it possible to remove mountains of waste material which previously had hidden the ore from view.

The development of this special equipment to meet rugged conditions encountered in off-the-highway mining service played an important role in the rapid expansion of the iron mining industry. Trucks carrying as much as 20 tons to the pay load trip became a common sight in nearly every pit on the range. The muffled snorts of the Diesel engines set the tempo for the huge new electric shovels while the soothing murmur of modern conveyor belts co-operated in carrying the ore to the surface. These new innovations made it possible to operate smaller and deeper pits profitably. Abandoned mines were reworked and side pockets were rapidly emptied of their valuable red deposits. Other well-established pits continued to grow in size until these gaping holes in the earth staggered the imagination. Probably the outstanding example is the Hull-Rust mine at Hibbing, Minn.

The first ore claims were staked out in the Hibbing area in 1892. Development of the Hull-Rust mine started three years later. Nature purified an unusually large amount of ore in this locality and through the years walls separating nine individual mines were dug away one by one. These nine mines consolidated with the Hull-Rust to form one gigantic pit. The resulting Hull-Rust Mahoning Group Open Pit Mine easily became the largest iron ore mine in the world.

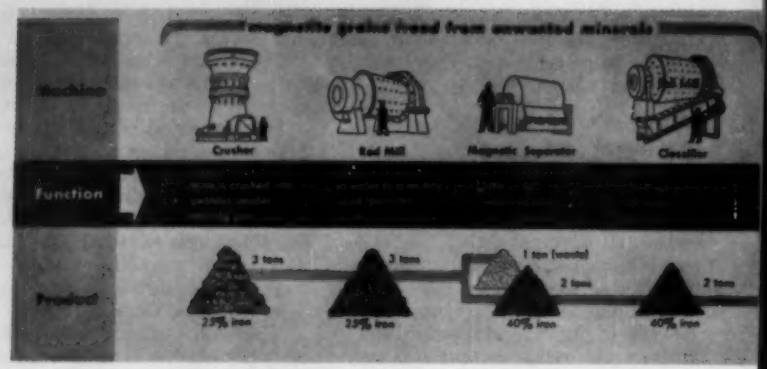
The Moving of Hibbing

A minor technicality slowed the expansion when it became apparent that the city of Hibbing had been constructed above the mass of high grade ore. This knotty problem was overcome in 1918 when the Northern half of the city was moved two miles to the south. The development then

continued unabated. The buildings were actually removed from their foundations and transported to the new location. The migration of the city continues to this day, but, of course, to a lesser degree.

The moving process made it possible for the mine to supply iron ore in ever increasing amounts. During World War II, for example, this single mine produced nearly one quarter of the iron ore mined in the United States. Total production from this pit exceeded the total produced by any individual country in the world, excluding, of course, the United States.

At the present time this tremendous man-made cavity has a maximum width of one mile and a maximum depth of 500 feet. It is 3¾ miles long and covers an area of more than 1500 acres. The total amount of material removed is rapidly approaching the one billion ton mark. The mine continues to operate on a 7-day week, 24-hour day schedule during the regular iron ore mining season.



a graphic demonstration o

Fear of Dwindling Resources

These fantastically large figures greatly impressed the experts, but the same figures also brought out another point in a very forceful manner. Mining engineers realized iron ore was a natural resource and that it never would be harvested as an annual crop. They knew even the richest mine on earth could not produce forever. Some day the direct shipping ores would be gone and shovel teeth would be broken on that "no-good taconite."

Fifty years ago some miners were predicting one day a rock would cause a downfall of the Giant Mesabi as it had caused the annihilation of the Giant Goliath in Biblical times. In the modern version the rock would be large boulders of taconite instead of several smooth pebbles, but the sinister effect on the giant would be the same. The Mesabi has served us well, they reasoned, but perhaps now we should concentrate on those untapped supplies of high grade ore in Venezuela, Liberia, Labrador, and other foreign countries.

Fortunately, however, men of vision did not take counsel of their fears. After all, at that time, only a small percentage of the high-grade ore in the eastern half of the Mesabi Range was being mined. The entire western end of the Mesabi contained an intermediate grade of ore that had not been touched. Was it not reasonable to assume that ways could be found to purify ore mechanically before attempting to use it in a blast furnace? And what about taconite? Agreed it's a tough problem, they said, but let's be realistic. Taconite represents 95 per cent of the iron bearing material on the Mesabi and we simply can't afford to have it lay idle while everyone prospects for high-grade ore in foreign lands. They agreed to thoroughly investigate the foreign ore situation, but it was difficult to convince them that our nation should become solely dependent on imported ore. The reasoning was obvious. In case of a national emergency they wanted no interruption in the supply line between the source of the raw material and the blast furnace.

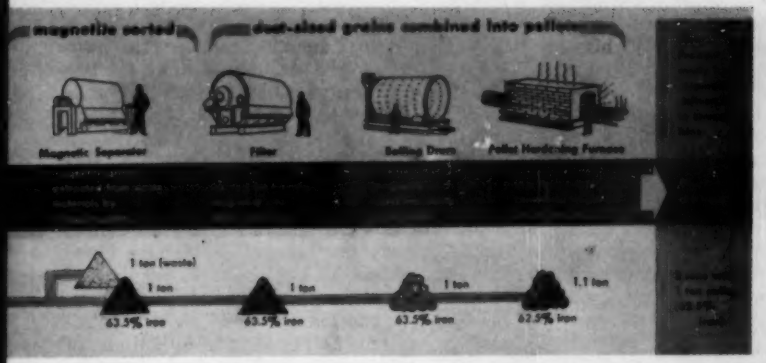
They also had great faith in the people this nation always produced in time of need. Given proper incentives and finances with which to work, trained men must find ways to improve lower grades of domestic ore. The ultimate objective must be to discover a technique which would separate the iron ore from that barren taconite rock. The major obstacle became a matter of cost. When commercial methods of artificially purifying ore were discovered, could the finished product compete with other foreign and domestic ore on the highly competitive open market? Only time would tell.

Thus, contrary to popular opinion, the beneficiation or improvement of undesirable ore into a merchantable product is far from a new idea. The Trout Lake Concentrator, the first facility built in Minnesota to commercially purify intermediate ore, was constructed in 1909. The owner was the Oliver Iron Mining Division of the United States Steel Corporation. The operation proved to be a success and soon all of the principal producers of Minnesota iron ore followed the example. Some companies, many of which are considered rather large by the iron ore mining industry, today obtain nearly all of their salable ores by improving on the product which nature provided. Thirty-eight per cent of Minnesota's ore shipments in 1956 were intermediate or low grade ores which had been concentrated into a useful product. The results have meant increased payrolls in the industry and the desirable conservation of reserves of direct-shipping ores.

Concentrating Low-Grade Ore

Concentrating low-grade ore is a simple process when done on a small scale. However, concentrating the same ore on a commercial basis is an entirely different matter. The process involves the use of modern specialized techniques, large and costly equipment, and highly trained experienced personnel. In its natural state the crude material varies greatly in mineral content. It also comes in a variety of sizes from fine dust-like particles to large bulky masses of ore and waste material. In the concentrating plant much of the dirt and sand are removed. Morsels of "concentrate" are then built up or broken up, as the case may be, into uniform sizes that are convenient to handle.

Most of the concentrates from this light colored material are produced by washing or scrubbing the ore in water to remove the soluble waste. A typical crude wash ore might contain 43 per cent mineral whereas the finished product could easily contain 58 per cent, depending, of course, upon a number of variable conditions. This product is transported by railroad to yards located near Lake Superior ore docks at Superior, Wisconsin, or Duluth or Two Harbors, Minn. The ore may be classified into any one of 27 different grades depending on actual iron content, moisture content, and other physical properties before it begins its 900-mile journey by ore boat to its destination at one



he processing of taconite

of the lower lake ports.

Unfortunately, much of the ore does not respond to this simple washing process. Often the ore has been compressed with the worthless material into hard layers which resist rapid penetration by water. These so called "jig ores" must undergo a more complex process of separation. This often means the material must be crushed and then ground to a fine powder. The desirable mineral is extracted from the waste magnetically or in a water bath. In the latter case the heavy iron oxide settles to the bottom while the lighter soil is flushed off at the top of the separating tank. Finely ground coal is added and the mixture is baked or "sintered" back into large clinker-like lumps which can be easily transported and ulitized in the blast furnace.

Chapters covering the past history and the present activities of the Mesabi Range revolve around the mining of the direct shipping ores and the beneficiation of the intermediate grades of ore. However, the future of the range rests with the development of taconite. Taconite does not resemble the high grade ores of the past. Mining and processing techniques are entirely different. Nevertheless, ore boats loaded with cargos of taconite concentrate contain some of the best ore ever to leave Minnesota.

Processing Taconite

The procedures used by Reserve Mining Company in their taconite mining and concentrating operations involve the fascinating story of the world's first full-scale taconite processing plant, one of the most expensive, privately financed industrial facilities of modern time. Reserve, with facilities located at the new towns of Babbitt and Silver Bay, Minn., was the first company in the world to make a useful blast furnace feed from useless taconite rock on a large scale. Again, it is an expensive process but steelmen agree that the development of taconite is one of the most important ventures in the colorful history of the iron mining industry in the United States.

Highly skilled men had carefully designed and planned every possible detail and five years had been allotted to transform the miles of blueprints into actual reality. The project became one of the truly great construction feats of recent times. At the height of the building activity nearly 5000 men were working hard to keep construction ahead of the unrealistic schedule. For a period of time wages and materials cost four million dollars a week. Total expenditure to put the plant into operation amounted to 190 million dollars.

With all due respect to old miners, who declared "Taconite was too lean and too hard," taconite is as lean and as hard as it has always been. On the other hand, our increasing knowledge about the world in which we live, supplemented by our ability to reach reliable conclusions based upon related scientific study, has changed taconite into a material which can now be utilized to man's advantage. For that reason, it is presently described in glowing terms as the mineral which will determine the future of the Mesabi Range as well as the future of an entire mining industry.

In reality, the vital change has been made in the minds of men. The plant which Reserve has successfully built is a real tribute to aspiring people who have reacted in a positive manner to new challenges brought about by changing times and conditions. It stands too as tangible evidence of new frontiers waiting to be conquered by ambitious men of vision who devote themselves to a just cause.

The Modern Taconite Era

The modern taconite era probably began in 1913 when Edward W. Davis, a young electrical engineer, became interested in the possibility of mechanically purifying the ore. He was aware taconite differed from conventional direct-shipping ore in the physical structure of the iron-bearing material and also the percentage of recoverable iron found in the ore. Direct-shipping ores contained a minimum of 50 per cent natural iron embedded in a relatively soft material. Taconite contained only about half as much iron scattered in minute pepper-like particles throughout an unyielding rock formation which approached the diamond in hardness. His enthusiasm grew, however, when he discovered the iron could be separated from the waste material in the laboratory. He crushed a small sample of the ore to a fine powder, washed the material many times in clean water, and then carefully used a hand magnet under water to draw the black specks of iron away from the white sand which remained. As early as 1914 Dr. Davis obtained a concentrate which assayed 68.88 per cent iron from a pulverized crude ore which contained only 29.11 per cent iron.

It was relatively easy to concentrate a small sample of taconite by hand in the laboratory. To concentrate a large amount of the same ore on a commercial basis was an entirely different matter. Dr. Davis continued his research as Director of the Mines Experiment Station at the University of Minnesota. He, and of course many others, conducted experiments, invented equipment, analyzed results, and probably more important, never lost faith. Their efforts paid off on September 13, 1956, 43 years after the original experiment, when Reserve Mining Company dedicated the world's first commercial taconite plant.

Reserve is jointly owned by Armco Steel Corporation and Republic Steel Corporation. Its only business is to mine and concentrate taconite ore for the 2 parent companies. At the present time the facilities have a rated capacity of 3¼ million tons of finished concentrate per year. Plans call for an increase in capacity to 10 million tons per year when economic conditions warrant the necessary expansion.

Reserve's mine is located on the eastern end of the Mesabi Range at Babbitt, Minn. Peter Mitchell's origi-

nal test pit, the first such test pit on the Mesabi Range, was sunk on this property 88 years ago. For that reason Reserve has appropriately named its mine the Peter Mitchell Taconite Mine. The concentrating plant is located 47 miles from Babbitt at the new town of Silver Bay, Minn. This facility has been officially named the E. W. Davis Works in honor of the man who played such an important role in the plant's development, as well as in the development of the entire taconite industry.

The Present Mining Operation

The first step in Reserve's present mining operation is to remove the overburden or waste material from the ore body. This, of course, allows the taconite to be mined by the open pit method. Fortunately, glaciers which passed over the area deposited a rather thin layer of material on the ore and actual outcroppings of the taconite through the overburden are frequent.

Following this stripping operation, holes for blasting purposes are sunk into the ore to a depth of about 40 feet. Conventional churn or diamond drills have not been able to do a satisfactory job in the stubborn taconite. An entirely new method of making holes was developed which applies a modern approach to the old Indian technique of using intense heat to chip pieces from an extremely hard rock. A flame thrower type, jet piercing machine is used to create a 4300 degree temperature. Whirling jets of liquid oxygen and kerosene are lowered into the hole on the end of a long derrick. The searing flame causes paper thin flakes of rock to chip away from the exposed surface. Sprays of water which instantly change to steam embrittle the rock and carry the taconite particles out of the hole. Thus a clean, cooled surface is always exposed to the rapidly rotating piercer and burning progresses at the rate of about 40 feet per hour.

Blasting crews move into the area and methodically fill the carefully spaced holes with high explosives. The detonation of 250 charged holes, with a vengeance breaks up about 330,000 tons of crude taconite. At present capacity this amount represents less than one week's supply of crude material. An interesting sidelight, and one which is perhaps indicative of the potential growth of the industry, is one which indicates the taconite industry at full capacity will use more explosives than any other civilian industry in the United States.

Following the "all clear" signal, electric shovels rapidly load specially designed, 45-ton, side dump trucks which haul the ore out of the mine to the primary crusher located nearby. The basic steps of crushing, grinding, and magnetic separation remain as important today as they were to Dr. Davis 45 years ago. The methods used to obtain the same results are entirely different, however. Reserve's primary crusher, for example, reduces various sized boulders into easily handled fist size chunks at the rate of 3500 tons per hour. Company owned trains then transport this crude material 47 miles on an interdepartmental railroad to Silver Bay for further processing.

About 50 tons of water is required to produce one ton of the finished concentrate. A plant location near a dependable supply of water is therefore an essential part of any taconite operation. A harbor located on one of the established shipping lanes is another item of major importance. Silver Bay, while it is 47 miles from the mine, is located on the north shore of Lake Superior and for that reason satisfies both requirements nicely.

After reaching this destination each gondola railroad car containing 85 tons of ore is rotated 155 degrees to discharge the material into a conveyor belt feeder. The crude ore travels rapidly via conveyor belt from the car dumper to the building where the final crushing operations are performed. A series of "coffee grinder" gyratory crushers pulverize the larger four-in. pieces into a multitude of ¾-in. pebbles.

These slate-like chips of crude ore progress to the ¼-mile long concentrator building where they are fed, with water into large slowly rotating barrel rod mills. The rock undergoes a continuous pounding by many heavy tumbling steel rods inside the rotating drum. This action crushes the rock to a soupy black, mud-like material which is carried along by an abundance of water into the first stage of magnetic and then hydro or water separation. The iron-bearing material is attracted to the magnets while about 30 per cent of the nonmagnetic impurities are rejected as waste material. Hydro separators serve the same purpose although they operate on an entirely different principle. The heavy iron particles settle to the bottom of a tank while the sand is flushed away at the top, again for disposal as waste material.

The desirable material, now partially enriched, flows to the ball mills where the coarse sand-like particles are ground to the fineness of flour. Ball mills are similar to rod mills in physical appearance. The thorough grinding is accomplished by the action of a multitude of steel balls rolling against each other for a long period of time.

The heavy, wet "slurry" is discharged from the ball mills and routed past the finishing magnetic and hydro separators where the final separation takes place. Vacuum filters remove all but about 10 per cent of the moisture leaving a jet-black soot-like concentrate consisting of approximately 64 per cent iron. This is, of course, a very high grade iron ore concentrate, but it is far from a finished product in this form.

The Concentrate Is Pelletized

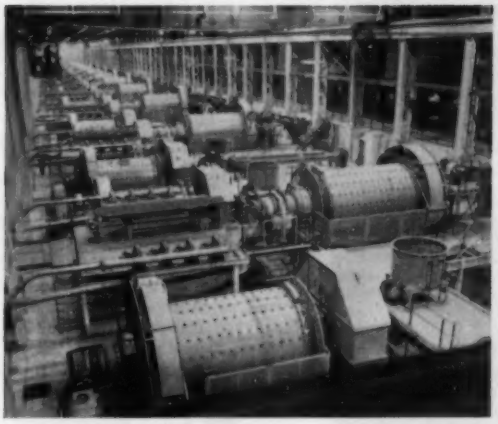
The concentrate, in the bulk, is extremely difficult to handle and is not satisfactory for shipment or for use in the blast furnace. The black powder must be built up into a more desirable product. This "aglomeration" may be accomplished in several ways. At Reserve the concentrate is "pelletized" or rolled into black balls each about 5/8 of an inch in diameter. The procedure used to form the pellets is a unique and exacting process once again perfected by Dr. E. W. Davis and his associates of the Mines Experiment Station at the University of Minnesota.

A small amount of binder is added as the concentrate is fed into the slightly elevated end of a hollow rotating drum. The moist particles readily adhere to each other and form into balls which roll down the inside of the drum and out the lower end of the cylinder. Vibrating screens automatically reroute undersized pellets back through the balling drums and select uniform pellets for transfer to coal coating drums. Here the little mud ball-like spheres are rolled over and over in anthracite coal dust. The purpose is to cover the soft pellets with a thin layer of coal which can be burned to fuse the individual pellets into hard clinker-like balls of concentrate.

The actual burning takes place in 168-ft. long sintering furnaces. Conveyor belts deposit 10-in. layers of the carefully prepared pellets on steel grates which travel slowly through the combustion chambers. Temperatures reach 2400° F. and the moist pliable pellets are fused hard enough to withstand a rather severe blow from a hammer without breaking.

The finished pellets are a very desirable product. They now contain about 63 per cent iron ore and only about 8 per cent silica. The pellets are hard, porous, and of constant quality. They represent a tailor-made iron

An aerial view of Reserve Mining Company's taconite processing projects shows cardumper building in upper center, fine crushing building just below, the ¼-mile long concentrator building. To the left steam marks the pelletizing building. In the foreground are pellet stockpiles and storage binds with an ore carrier moving into loading position. To the right is the new 50,000-KW power plant. The new community of Silver Bay is in the foreground.



Part of the reduction process is the rod mill operation grinding taconite to flour fineness.

Final magnetic separation of ore from wastes is accomplished by 72 magnetic separators.

Concentrate is then rolled in rotating drums with coal into small balls before being baked.

Pelletizing furnaces bake pellets at 2400° F. Pellets of ore are then sent to stockpiles.

ore concentrate in a form which can be readily used to make pig iron and quality steel with a minimum of time and effort. All of this from the low-grade, worthless crude taconite rock!

During the regular shipping season ore boats are loaded with pellets for immediate shipment to Armco and Republic steel mills. During the winter months when ore boats are icebound, the pellets are stock piled at the plant side until Spring when boat shipments to lower lake ports can again be made. At present capacity about 15 boatloads a week are transported to the parent companies.

What does the future hold in store for the Mesabi Range and taconite? There is little doubt that shipments of direct shipping ores will gradually decrease in size. On the other hand with our nation's leaders anticipating an expanding national economy, it seems reasonable to expect an unprecedented demand for high-grade iron ore in the future. Imported ores from foreign countries such as Labrador and Venezuela will certainly assume added importance. In 1950, for example, only about 7 per cent of the iron ore we used in the United States was imported from other countries. By 1975 imports will probably supply a minimum of ⅓ of our much larger iron ore requirements.

Processing Taconite Versus Importing Natural Ores

Shipments of taconite concentrates will be increased considerably also. The role which taconite will play probably will be determined by the cost of processing taconite in comparison with the cost of importing natural ores. Both sources will be attempting to improve their competitive position by lowering costs, by increasing production, and by improving the quality of their product.

People engaged in taconite operations have reason to anticipate a bright future for the industry. Huge sums of money have been spent on research and study. Expected technical advances and experience gained in taconite plant operation will certainly help to make a better concentrate at a lower price. These certainly are valid reasons for optimism.

In the final analysis, however, the success of this new industrial process should not be measured by the number of tons produced, nor can its importance be judged by monetary standards alone. Instead, the determining factor must be the extent to which taconite continues to satisfy basic human needs and contributes to the improvement of the general welfare of mankind. ◀

Auto Mechanics as an Occupation

Auto mechanics and electricity are probably the two most popular occupational areas with boys and young men in high schools and vocational schools throughout the country. They should, however, be given a realistic picture of the opportunities to be found in auto mechanics and realize that there are only about six major divisions in the field if we exclude the opportunities to be found as automobile service station attendants and similar categories.

An automobile mechanic is defined by the *Dictionary of Occupational Titles: Part One: Definition of Titles* as follows:

Automobile Mechanic; automobile repairman; automobile service mechanic garage man; garage mechanic; garage repairman (auto service) 5-81.010 Repairs passenger automobiles and light delivery trucks, performing duties, such as disassembling and overhauling engines, transmissions, clutches, rear ends, and other assemblies on automobiles, replacing worn or broken parts, grinding valves, adjusting brakes, tightening body bolts, and aligning wheels; uses hoists, various sized wrenches, gauges, drills, grinding wheels, and other general or specialized machines, gauges and tools. This worker, when employed in a public garage, may be restricted to repair of automobile motors, transmissions and clutches, the remainder of the repair work being performed by other workers: Automobile Tester; Brakeman, Automobile: Carburetor Man II; Motor Analyst; Tire Repairman II; Wheel Alignment Mechanic.

Work in the field of auto mechanics is mostly to be found in the service department of car dealers and independent general repair shops. Mechanics are also employed in brake, electrical, and similar specialist shops, in the garages of transportation companies and other large firms which service their own fleets, and in some gasoline filling stations. Many auto mechanics are in business for themselves with the help of one or more hired mechanics.

Earnings in the field vary considerably, depending largely on the individual's skill and the size and location of the shop where employed. The earnings of self-employed mechanics vary still more, influenced by the number of mechanics working for them. The weekly earnings depend on the number of hours worked in a week, usually 40 a week and whether premium rates are paid for overtime. Earnings are generally higher in the larger cities. The highest average earnings were reported in the Pacific region. Seasonality is slight in this trade and unionization not very extensive.

The 1940 census data revealed that there were 442,000 auto mechanics: 377,000 employed and 65,000 unemployed. During the war many went into war industries and into the armed forces. The level of employment dropped sharply even though thousands without previous experience were trained. Since the war, employment quickly returned to the previous level and rose slowly to about 450,000 in 1950 and somewhat further thereafter. In addition some 5000 to 7000 job openings may be expected each year owing to death and retirement of mechanics. However, men returning to their former jobs, plus those newly trained in the armed forces who will want to stay in the work will exceed the number of jobs to be had. As a result, many of the less experienced men will have trouble finding work. Highly skilled and experienced mechanics should generally be able to find work, and some may even be able to open their own shops. One can conclude that men with no experience in the work will have little opportunity to enter the trade at least for several years.

Jobs in auto mechanics can be found in all parts of the country, including the small rural communities. The greatest concentrations are, however, in the states with highest number of motor vehicles — New York, California, Pennsylvania, Illinois, Texas, and Ohio.

There are opportunities in the auto mechanics field for highly skilled men. An oversupply of less skilled mechanics seems likely for the next few years. ◀

— Ernst H. Suerken
Dobbs Ferry, N. Y.

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Automation and Society

Edited by Howard Boone Jacobson and Joseph S. Roucek. Cloth, 553 pp., 5⅞ by 8½ in., $10. Philosophical Library, Inc., New York, N. Y.

This work is at once a nontechnical and practical handbook — a current history — and a readable introduction to one of the most challenging developments in modern industrial society.

The editors believe that automation is far more than a mere technological accomplishment, but rather that it is an intellectual and social challenge, full of promise and with problems.

The book presents the findings of many experts who have examined the present and potential impact of automation upon many facets of our society.

The material is presented in four sections under the following broad classifications: the concept of automation; automation applied; automation and responsibility; and automation and society.

Simplified Problems in Strength of Materials and Structural Design

By Ephraim Viertels. Cloth, 636 pp., 5¾ by 8¾ in., illus., $5. Arco Publishing Co., Inc., New York, N. Y.

This book is an all-problem reference work prepared for the structural engineering field. It is in three parts, and has 22 subject headings. Questions on each subject are presented, then problems on that subject are stated and solved in step-by-step fashion. There is a total of 735 problems.

Part I covers: simple stresses; graphic statics; center of gravity; reactions of beams, girders, roof trusses, and arches; shear and shear diagrams; bending moment and moment diagrams; influence lines; and torsion.

Part II: elements of theory of bending; moment of inertia; design of steel and wooden beams; floor design; rivets and riveted connections; welding and welded connections.

Part III: design of plate girders, columns, bearing plates, and roof trusses.

The Saco-Lowell Coaching System — On-the-Job Coaching Simplified

By Albert F. Koepcke. Paper, loose-leaf, 8½ by 11 in. Saco-Lowell Shops, Boston, Mass.

This booklet was prepared to meet the problems involved in training and coaching new employees. It is printed in six separate sections and bound so that an individual can be provided with only those sections pertinent to his job.

The Saco-Lowell Coaching System is designed to help the coach, the trainee, and those responsible for getting a job done, to speed up this mutual process of coaching and learning.

The book contains Section I — Preface and On-the-Job Coaching Simplified; Section II — If You Are a Trainee; Section III — If You Are a Coach; Section IV — If You Are a Supervisor; Section V — If You Are Installing the Saco-Lowell Coaching System; and Section VI — Examples.

Exploring Patternmaking and Foundry

By Harvey D. Miner and John G. Miller. Cloth, 206 pp., 6⅛ by 9¼ in., illus., $4.85. D. Van Nostrand Co., Inc., Princeton, N. J.

This text was written specifically for beginners in the patternmaking and foundry trades who want to learn the basic operations required of both these highly specialized technical fields. The authors describe in simple, complete form the use of the various tools and processes. More than one hundred line drawings and photographs clearly demonstrate each necessary piece of equipment and each step in these two important fields, emphasizing the methods now used in industry, and a well-selected series of projects and exercises provides thorough practice in each operation.

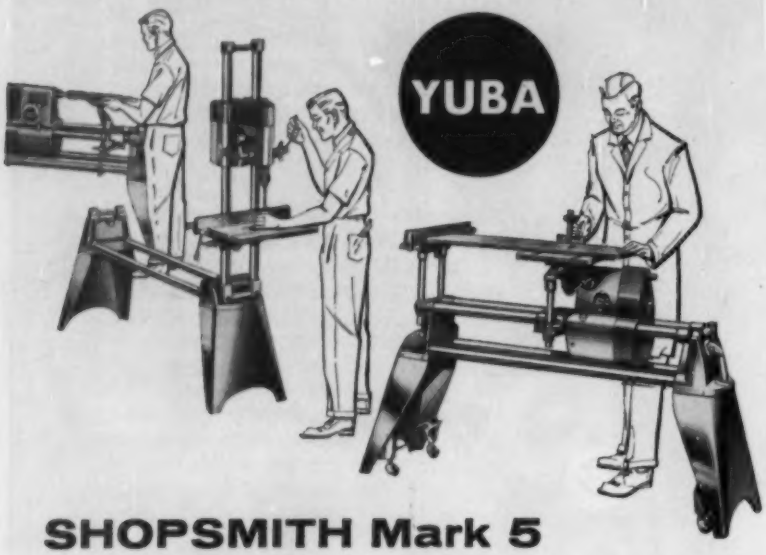
This book will be equally valuable for trade or technical school courses in patternmaking and foundry and for industrial or vocational teacher training programs.

How Photography Works

By H. J. Walls. Cloth, 352 pp., 5¾ by 8¾ in., illus., $8.50. The Macmillan Company, New York, N. Y.

This book answers the question: what makes photography tick. The author describes the scientific background of the photographic processes in a remarkable panorama of facts and reasoning. The whole of photography is explained to the curious and intelligent reader by taking him on an informative and entertaining tour through more than one region of contemporary science — optics, chemistry, visual perception — following in the tracks

(Concluded on page 24A)



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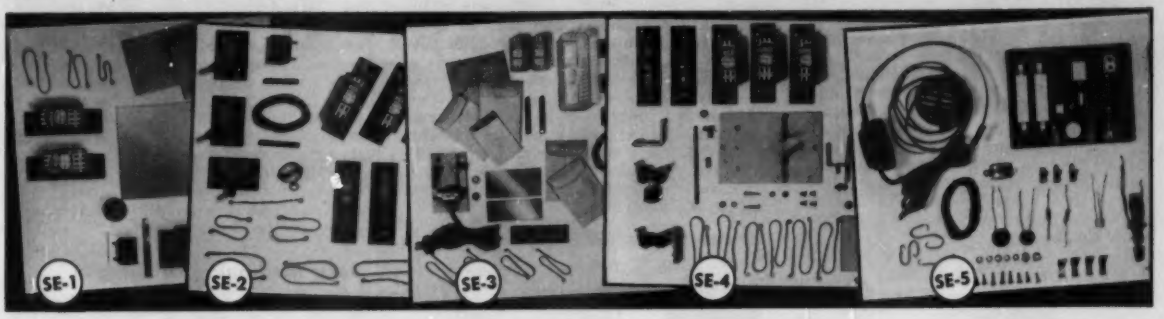

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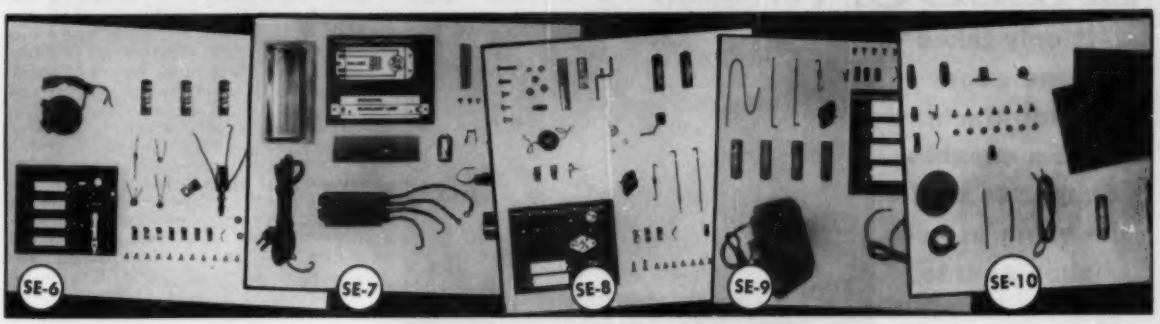

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NEW BOOKS

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of the black-and-white as well as the color image.

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Basic Electronics

By Bernard Grob. Cloth, 523 pp., 6¼ by 9¼ in., illus., $6.50. McGraw-Hill Book Co., Inc., New York, N. Y.

This book, written especially for the student who has no background in mathematics, offers a clear and complete introduction for beginners who plan to study electronics, radio communications, FM, TV, radar, and industrial electronic applications. It provides the student with the essential principles of electricity, magnetism, and simple electric circuits in nonmathematical language and develops his ability to use this knowledge by carefully designed problems. It is the first book in a two-volume package. The second text is *Applied Electronics*.

General Shop for Everyone

By Lewis V. Newkirk. Cloth, 280 pp., 6¾ by 9¼ in., illus., $3.80. D. C. Heath & Co., Boston, Mass.

This well-illustrated book provides all the text material needed for a well-rounded general shop course. Fundamental information about job planning, drafting, woodworking, metalworking, electricity, plastics, leatherwork, and other common phases of general shopwork is included. Each of the six units gives information about a particular industry and its workers; explains how to use common hand tools and simple machines; calls special attention to safety precautions; gives useful consumer information; provides projects, problems, and review questions; describes and illustrates tools and materials for interesting hobbies to enjoy in the home workshop.

Basic Mechanical Drawing

By Herbert E. Welch. Cloth, 406 pp., 7½ by 10 in., illus., $5.25. McGraw-Hill Book Co., Inc., New York, N. Y.

This book is for the beginning student in mechanical drawing. Each lesson has been classroom-tested by the author for several years and carefully revised on the basis of this experience. Each lesson is a definite assignment. This should facilitate grading and checking of student progress.

Chapters 1 to 18 explain tool use and care, learning to letter, view drawing, dimensioning your drawings, drawing angles and slanting surfaces, drawing round objects, tangents, the ellipse, drawing sectional views, machine fastenings — bolts and nuts, technical sketching, working drawings, tracings, duplicating drawings, drawing with ink, sheet-metal pattern drawing, pictorial drawing, and perspective drawing. There is also an index.

The Diesel Engine

By L. V. Armstrong and J. B. Hartman. Cloth, 360 pp., 5¾ by 8½ in., illus., $8.75. The Macmillan Company, New York, N. Y.

This book is a reflection of the authors' extensive experience in the field, and presents a comprehensive and logical treatment of the diesel engine. A discussion of petroleum and refining methods is followed by a consideration of diesel fuel combustion. Next, the authors examine the effect of the forces released by combustion upon the moving parts of the engine and then on the static or restraining parts of the engines. After a treatment of "parasitic engine parts," there is a final section on economics, including power application.

An outstanding characteristic of the book is the introduction, at strategic points, of a Basic Design Problem, pointing up the practical value of the theory with which it is associated.

Most-Often-Needed 1959 Radio Diagrams

By M. N. Beitman. Paper, 192 pp., 8⅜ by 10 11/16 in., illus., $2.50. Supreme Publications, Highland Park, Ill.

This is Volume R-19 on this subject prepared for those who repair radios. It contains clearly printed schematics, needed alignment data, lists of replacement parts, voltage values, etc., on all new 1959 radios.

Planning Industrial Arts Facilities

Ralph K. Nair, editor; Paul L. Scherer, associate editor (illustrations); and Lynne C. Monroe, consulting editor. Cloth, 247 pp., 6¼ by 9¼ in., illus. Eighth Yearbook of the American Council on Industrial Arts Teacher Education. Foreword by John Fuzak, president.

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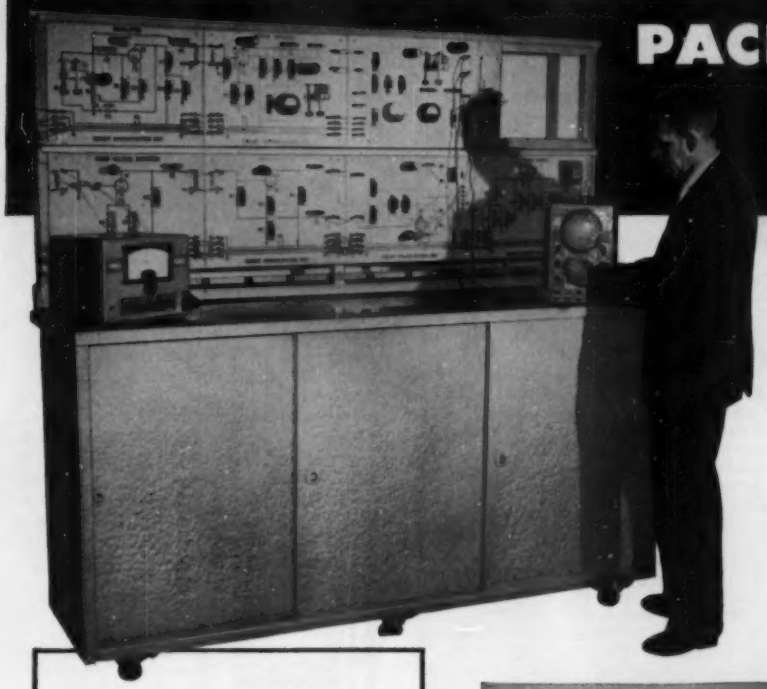

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A variety of packages is offered. Any High School, Academic or Vocational, can select a course to suit specific educational objectives.

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Contained within the cabinet base are as many as 40 "building block" panels, depending upon the package selected. The entire console unit moves easily on its own casters and plugs into any regular A.C. outlet.

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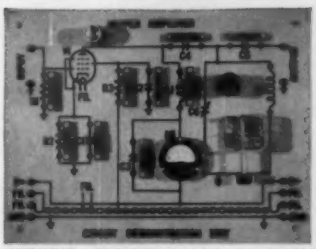

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PERSONAL NEWS

(Concluded from page 12A)

cago, Ill. His appointment was effective September 1, 1959.

● Academic promotions for fifteen members of the faculty at Illinois Institute of Technology, Chicago, have been announced by President John T. Rettaliata. The promotions became effective September 1.

Promoted to the rank of professor are: Alfred Caldwell, architecture; Manley H. Jones, business and economics; Mary L. Kilpatrick, chemistry; and Linvil G. Rich, civil engineering.

Promoted to the rank of associate professor are: Russell Edwards, chemistry; G. Lykos, chemistry; Sidney Miller, chemistry; George J. Ross, psychology; Aaron Siskind, Institute of Design; and Liang N. Tao, mechanics.

Promotions to the rank of assistant professor are: R. Gene Geisler, political science; Gordon Martin, Institute of Design; Robert J. Romagnoli, physics; Kenneth Schug, chemistry; and Earl F. Zwicker, physics.

● *Charles E. Shoemaker* and *Dr. William E. Huss,* faculty members of the Industrial Arts Education Division at State University Teachers College, Oswego, have authored chapters in the newly published yearbook of the American Council on Industrial Arts Teacher Education, "Planning Industrial Arts Facilities."

Mr. Shoemaker is the author of a chapter entitled "Industrial Arts in Modern Education," the first chapter following the book's introduction. He is assistant professor of industrial arts education.

Dr. Huss, professor of industrial arts, is the author of a chapter entitled "Principles of Laboratory Planning." He returns to the college campus this fall after two years' leave of absence to work with a team organizing industrial arts education in the Philippines.

● *Dr. Paul Hiser,* professor of industrial arts education, State University of New York Teachers College, Oswego, was recently elected national vice-president of the American Council on Industrial Arts Teacher Education.

● *Dr. Nicholas A. Weil* has been named director of mechanical engineering research at Armour Research Foundation of Illinois Institute of Technology, Chicago.

Retirements . . .

● *Dr. Howard A. Campion,* associate superintendent of extension and higher education, Los Angeles City Schools.

He was born in Minnesota where he received his early schooling. After graduating from the Stout Technical Institute in Wisconsin, he was granted an A.B. from the University of California, and an M.A. and an Ed.D. from the University of Southern California.

His career in public education started in the Boise, Idaho, High School in 1914, and shifted to the Stockton, Calif., High School in 1916. His career was temporarily sidetracked while he served in World War I. He later returned to the Stockton Schools to serve in the capacity as Director of Continuation Education. In 1923 he left Stockton to take the position as assistant supervisor of vocational teacher training at the University of California at Los Angeles.

Dr. Campion was appointed to the important task of planning, opening, and administering the Frank Wiggins Trade School, and under the tutelage of Dr. Campion this school attained world-wide recognition.

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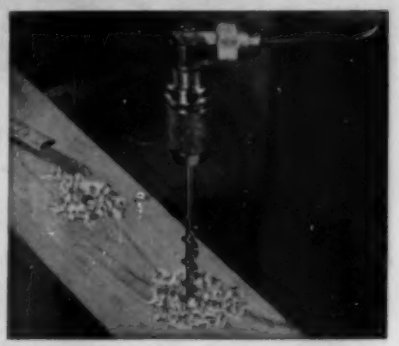
help get school shop projects done on time



The faster, cleaner, always accurate boring action of Irwin wood boring tools saves time and materials, steps up class room efficiency. Projects get done on time. The quality of the finished job stimulates student interest and appreciation of good workmanship. And replacement costs are lower, too. Irwin wood-boring tools are made to last much longer. Put Irwin to work in your shop and see. Order from your school shop jobber or independent hardware dealer.

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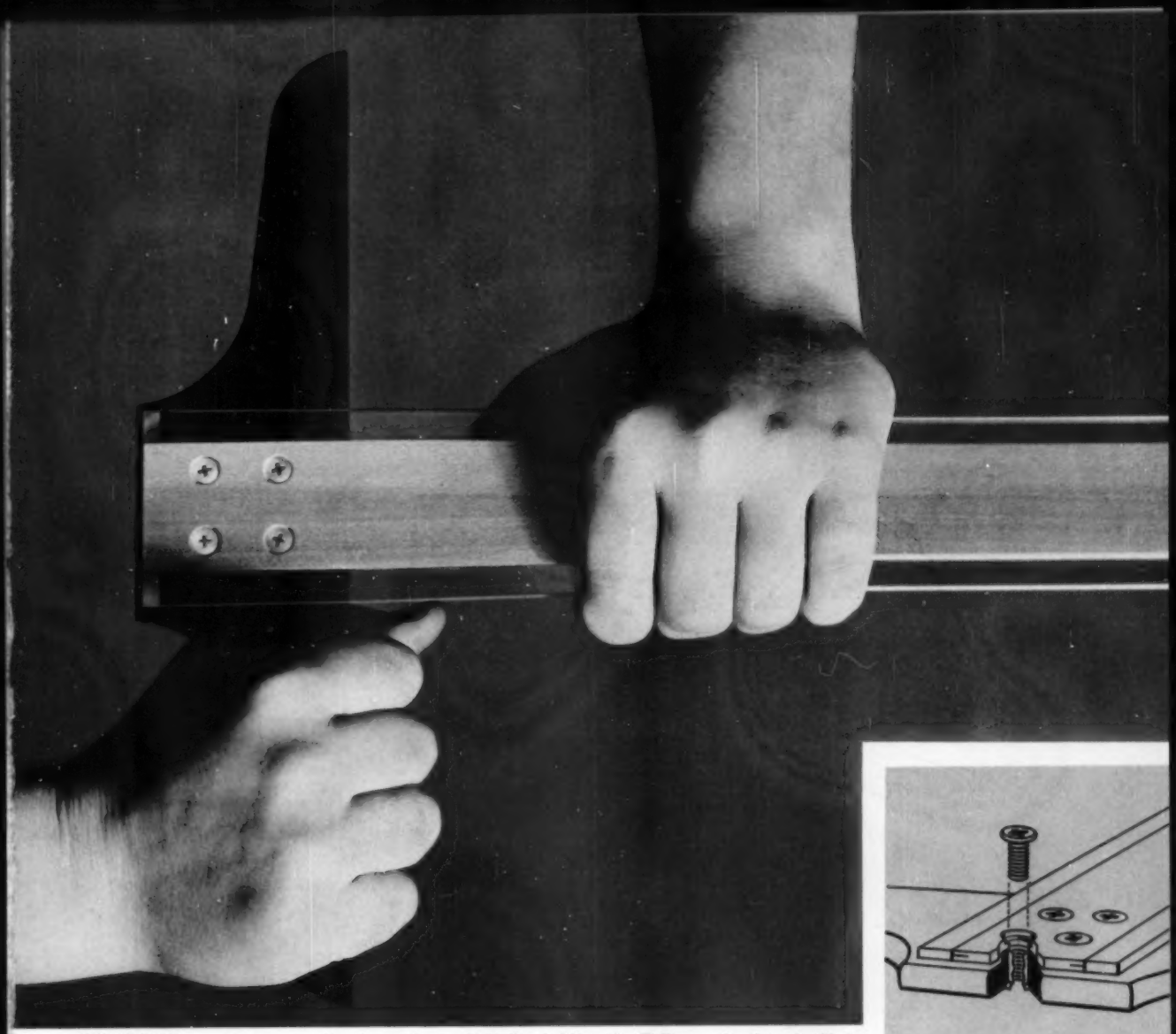

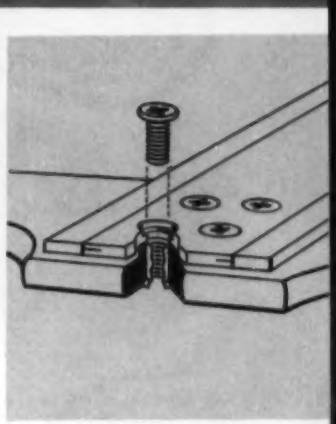

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NATIONAL ELECTRONICS CONFERENCE

The 15th National Electronics Conference will meet October 12 to 14, 1959, at the Hotel Sherman, Chicago. The 1959 NEC will hold sessions in adaptive servomechanisms, antennas and propagation, audio, circuit theory, communications systems, computers, information theory, instrumentation and telemetry, masters, microminiaturization, microwaves, millimeter waves, parametric amplifiers, plasma research, radar and radio navigation, servomechanisms, signal matched filters, solid-state circuits and devices, space electronics, communication and navigation, television, transistors, and value engineering.

The NEC is sponsored by the American Institute of Electrical Engineers, Illinois Institute of Technology, Institute of Radio Engineers, Northwestern University, and University of Illinois.

Participants are: Michigan, Michigan State, Notre Dame, Purdue, Wayne State, and Wisconsin Universities, Electronic Industries Association, and the Society of Motion Picture and Television Engineers.

Hal Bergen, 185 N. Wabash Ave., Chicago 1, Ill.

INDUSTRIAL MANAGEMENT GROUP CONVENES

The 23rd Annual Industrial Engineering and Management Clinic will be held on November 5 and 6, 1959, at the Conrad Hilton Hotel, Chicago. More than 1500 industrial engineers, works managers, plant superintendents, and production executives are expected to attend the technical sessions sponsored by the Industrial Management Society.

The latest developments in the fields of time and motion study, work simplification, job evaluation, methods, production control, plant layout, and human relations, will be discussed by experts from over the country.

Industrial Management Society, 330 South Wells St., Chicago 6, Ill.

SCIENCE — IE CONFERENCE AT OSWEGO

The Industrial Education Conference, held at State University Teachers College, Oswego, N. Y., on July 15, heard three speakers as they addressed the opening session on the topic "Science and Industrial Education."

Charles O. Trabold, General Electric Company's Design Development Laboratory, Defense Electronics Division; Abraham G. Beleson, Science Techniques Laboratory instructor at the High School of Science, Bronx; and Robert D. Roach, Jr., chief of Applications Engineering, Rocket Department, Bell Aircraft Division, were the speakers.

Dr. Frank Robinson was chairman, and Dr. Paul Hiser cochairman of the Conference. On the committee were Earl Spaar, Donald Shutts, and John Somerville.

WELDING SOCIETY CONVENES

The American Welding Society held its national fall meeting, September 28 to October 1 at the Sheraton-Cadillac Hotel, Detroit, Mich.

Sixteen technical sessions were held, each session covering a particular process or subject, including the following: resistance welding, toughness in steel weldments; automotive welding, toughness in steel weldments, brazing; automotive welding, miscellaneous alloys; nondestructive testing, inert-gas welding, welded structures; weldability of steels, process development; aluminum, welded structures; titanium, tantalum, and beryllium; and weldments.

COMING CONVENTIONS

Oct. 2–3. Ohio Vocational Association, at Southern Hotel, Columbus, Ohio. Secretary, Ralph J. Woodin, Room 203, 2120 Fyffe Rd., Columbus 10, Ohio.

Oct. 9–10. Four State Industrial Arts Conference, at Kansas State Teachers College, Pittsburg, Kans. Pirate, Forest L. Penny, Kansas State Teachers College, Pittsburg, Kans.

Oct. 16. Maryland Vocational Association, at Fifth Regiment Armory, Baltimore, Md. Secretary, Tolbert Lawyer, Thurmont, Md.

Oct. 22–23. Oklahoma Industrial Arts Association, at Oklahoma City University, 2501 N. Blackwelder, Oklahoma City, Okla. Secretary, Cary L. Hill, Oklahoma State University, Stillwater, Okla.

Nov. 12–14. Mississippi Valley Industrial Arts Conference, at LaSalle Hotel, Chicago, Ill. Chairman, Dr. Verne C. Fryklund, Stout State College, Menomonie, Wis.

Dec. 6–9. American Technical Education Association, at Conrad Hilton Hotel, Chicago, Ill. Secretary, William N. Fenninger, 22 Oakwood Place, Delmar, N. Y.

Dec. 7–11. American Vocational Association, at Conrad Hilton Hotel, Chicago, Ill. Pirate, Lowell A. Burkett, 1010 Vermont Ave., N.W., Washington, D. C.

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Jack Plane
Finest Bench Planes Made
Millers Falls bench planes have an exclusive 3-point bearing lever cap for extreme rigidity. A precisely fitted cutter cap gives the cutting edge extra support . . . assures velvet-smooth action. The solid, one-piece cutter iron of finest tool steel is hardened, ground and honed to razor sharpness.
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The comfortable, molded plastic handle quickly and easily adjusts to alternate positions to make 2 tools in 1. Hundreds of hardened cutting edges on both sides of the double-sided English steel blade cut everything from soft wood to tough steel. Replaceable blades: Coarse, fine, and new lifetime lasting tungsten carbide.
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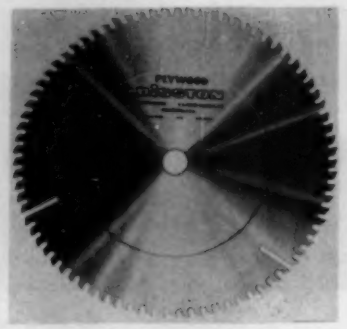


Disston Circular Saw Blade

(For further details encircle index code 0801)

Train Your Graphic Arts Students

ON CHANDLER & PRICE PRESSES AND CUTTERS

Exactly as Used in Commercial Plants

When you specify Chandler & Price Equipment for your printing department, you can train your students on exactly the same kind of presses and paper cutters used extensively in commercial printing plants. With Chandler & Price your training can cover all essential details of printing press and paper cutter operation.

Chandler & Price Model-N Hand-fed Platen Press Recently announced, the Chandler & Price Model-N press has been widely accepted by schools all over the country. This is a complete press, from floorpan to impression counter. Every operation required on a hand-fed press can be taught on the Model-N, including both color and fine halftone printing. 3 sizes—8″ x 12″, 10″ x 15″ and 12″ x 18″—offer a complete range for any school printing shop.

Chandler & Price Pilot Press — Many thousands of these small presses are in use in schools and other institutions. The basic fundamentals of printing can be taught with this press which does an exceptionally fine job of printing. Chase size 6½″ x 10″. Can be equipped with an ink fountain, if desired. Steel cabinet stand is also available on which to mount press.

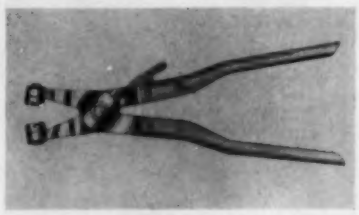
Chandler & Price Lever Paper Cutters—This 26½″ lever paper cutter is ideal for school shops. A two-handed safety knife stop is standard equipment. A special safety device can be added, if desired, which requires two-handed operation of the cutting lever. 19½″ and 23″ lever cutters for bench mounting can also be furnished.

Write for complete information. Chandler and Price equipment is fully described in available literature. See your C & P dealer, or write us.

THE CHANDLER AND PRICE COMPANY
6000 Carnegie Avenue • Cleveland 3, Ohio
Manufacturers of dependable printing presses and paper cutters

HERBRAND "TOOL-OF-THE-MONTH"

The Bingham-Herbrand Corporation introduced a host clamp plier with finger-tip position lock as their current "Tool-of-the-Month." The new "finger-tip" feature makes it possible to lock the plier in any one of three positions, freeing the mechanic's hands for other work.



Tool-of-the-Month

Lightweight and perfectly balanced, the Herbrand hose clamp plier even makes easy work of replacing the lower radiator hose.

(For further details encircle index code 0802)

X-ACTO PLEXON LINE ADDS "JEWEL TONE" COLORS

Dozens of new color combinations for craft jewelry projects are possible with the new "jewel tone" Artcraftstrip added to its Plexon line by X-acto, Inc., manufacturer of hobbycraft tools and kits.

A strand of gold or silver thread, bonded to plastic Plexon strips, has been combined with 12 popular colors to produce striking new materials for lacing or braiding lanyards, bracelets, barrettes, and other craft accessories. The easy-to-make projects can be turned out by youngsters of all ages in camp or school classes.

Non-stretchable, flame retardant and non-tarnishable, the metallic strands run through the center of the Plexon Artcraftstrip. Gold centers have been added to white, pink, red, orange, purple, light yellow, and black strands. Chartreuse, light blue, dark blue, and dark green strips all have a silver center.

(Continued on page 32A)

(For more information from advertisers, use the postcard on page 55A)

STUDENTS BUILD WATER SKIS

from quality S-4-S (bent only) stock

also NEW STEP-BY-STEP INSTRUCTION UNIT

STUDENT STARTS WITH ROUGH PRE-BENT BLANKS

Now any student can own the finest water skis, and, increase his woodworking skills. Ski blanks and fittings are supplied by one of the world's largest producers of quality water skis. Scale drawings and instruction sheet included.

SPECIFICATIONS:

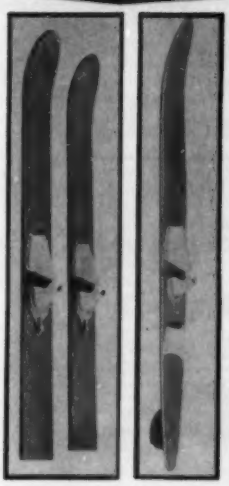
Stock ⅞" thick x 7" wide x 6' long, permanently bent at one end with hardwood spline reinforcing toe of ski. BINDINGS: White Neoprene rubber. Aluminum parts, single adjustment, self-locking heel plate.

STUDENTS DEVELOP CRAFTSMANSHIP BY COMPLETING THE FOLLOWING STEPS:

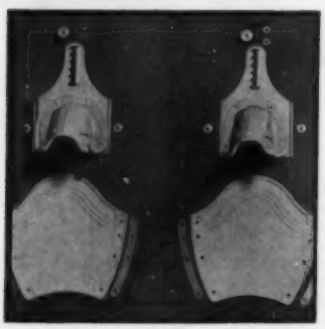
1. Blow up scale drawing.
2. Lay out pattern on blank.
3. Cut blank to length.
4. Add spline at aft end.
5. Band saw shape.
6. Shape edge.
7. Flat sand.
8. Edge sand.
9. Seal and seal sand.
10. Varnish and wax.
11. Drill for fittings.
12. Make rudders.
13. Assemble.

No.	MATERIAL
B-1	Marine plywood, with Crezon surfaces (plastic and wood fibre overlay).
B-2	Sitka Spruce, vertical gr.
B-3	Philippine Mahogany.
B-4	Solid White Ash.
A-10	Fittings for Pair Models.
A-11	Fittings for Slalom model, including deep rudder.
F-1	Ski Finish, 1 pt. sealer and 1 pt. clear finish.
F-2	Ski Finish, 1 pt. sealer, 1 pt. yellow finish.
T-1	Complete Instruction Unit.
T-2	Instruction Card only.

FINISHED SKIS WILL LOOK LIKE THIS



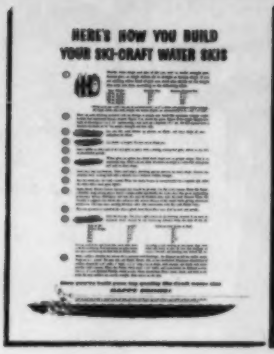
PAIR MODEL SLALOM MODEL



No. A-10. Fittings for Pair Models.

SKI CRAFT CUSTOM WATER SKI FINISHES

This unit consists of one pint of Ski Craft Custom Sealer-Primer plus one pint of Clear Finish, or, one pint of Yellow Finish. These finishes are specially compounded to withstand the hard usage, pounding, and moisture inherent in water skiing. Complete finishing instructions included. Write to your distributor or direct for price lists.



STEP-BY-STEP INSTRUCTION UNIT

Scores of vocational instructors have asked us for it, so here it is . . . a simple, step-by-step, easy to follow Instruction Unit for your students who choose to build their own water skis. The complete teaching unit consists of a large 19"x25" illustrated Instruction Sheet, designed to be taped to the bulletin board or wall, plus one stubby ski which illustrates the mounting of fittings, and how the ski should look when shaped, sanded and finished. The instruction unit is available at factory cost either as a complete kit including the 19"x25" Instruction Sheet and the Finished Ski, or the Instruction Sheet alone may be ordered.

Complete Unit including Ski and Chart ..... **$5.00 postpaid**
Instruction Chart only ..... **.50 postpaid**

For complete information and cost, write direct or contact your distributor. (See distributor list below.)

ASK THE DISTRIBUTOR IN YOUR AREA ABOUT SKI BLANKS

Atlanta Oak Flooring Co.
Atlanta, Georgia
Charlotte, North Carolina
Chattanooga, Tennessee
Greenville, South Carolina
Jacksonville, Florida
Miami, Florida
Orlando, Florida
Raleigh, North Carolina
Savannah, Georgia
Tampa, Florida

Brodhead-Garrett Company
Cleveland, Ohio

Albert Constantine & Son
Bronx, New York

General Hardwood Co.
Tacoma, Washington

J. E. Higgins Lumber Co.
San Francisco, Calif.

Kilpatrick Brothers
Oklahoma City, Okla.

Omaha Hardwood Lbr. Co.
Omaha, Nebraska

Lumber Products
Portland, Oregon

Frank Paxton Lumber Co.
Kansas City, Missouri
Chicago, Illinois
Milwaukee, Wisconsin
Denver, Colorado
Des Moines, Iowa
Fort Worth, Texas
Midland, Texas

Southwest Supply Co., Inc.
Glendale, California

Strable Lumber Company
Oakland, California

Strevell-Pareson Hdwe. Co.
Salt Lake City, Utah

Winde-McCormick Lbr. Co.
Charlestown, Mass.
Providence, Rhode Island

Youngblood Lumber Co.
Minneapolis, Minnesota

Manufactured by

WESTERN WOOD MFG. CO.

6348 S. W. Macadam Avenue • Portland 1, Oregon

(For more information from advertisers, use the postcard on page 55A)

PRODUCTION TOOLS of ADVANCED DESIGN by

BERKROY

24"–30"–36"
BOX & PAN BRAKE
Accurate • Versatile • Economical
This rugged tool bends sheet steel up to 16 ga. Combines outstanding mechanical features.

18"–24"–30"–36"
SLIP ROLL
The slip roll with the extra features. Fully enclosed steel gears.

Sheet Metal SHOP-ON-A-BENCH
A 5 tool sheet metal shop in one compact unit.
- Nibbler-Slitter – 12" Throat
- 12" Brake
- 12" Slip Roll
- Shear & Clamping Head
- Hand Punch

Above tools are also sold individually.

For Graphic Arts

POWER HACK SAWS
No. 2 4" x 4"
No. 3 6" x 6"

RUBBER STAMP PRESS
A new concept in rubber stamp production equipment at a fraction of the cost of high priced machines.

SOLD THROUGH INDUSTRIAL DISTRIBUTORS

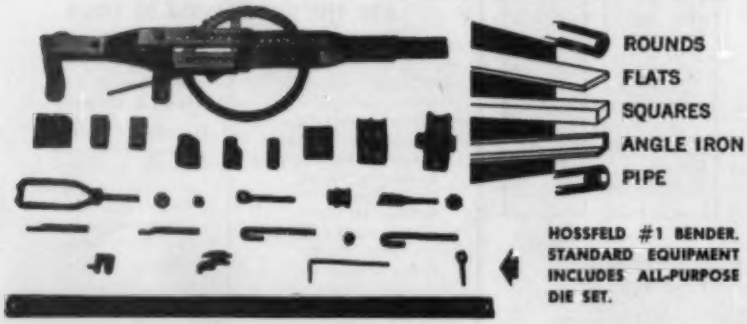
For catalog information, write to

BERKROY PRODUCTS CO. 1171 East 32nd Street, Los Angeles 11, Calif.

FIRST in its Class

HOSSFELD *Universal*® IRON BENDER

1 Instructor + 1 Hossfeld Bends All These:



ROUNDS
FLATS
SQUARES
ANGLE IRON
PIPE

HOSSFELD #1 BENDER. STANDARD EQUIPMENT INCLUDES ALL-PURPOSE DIE SET.

35 years bending experience makes the Hossfeld #1 Iron Bender tops as a tool for school shop instruction, and without equal in maintenance and limited production work.

5 REASONS WHY:

1. WRENCHLESS: Ready to use
2. PRACTICAL: Quick setup
3. ADAPTABLE: Replaces special equipment
4. VERSATILE: Reproduces practically any everyday bend
5. INVALUABLE: As indispensable as a bench vise

Get the Facts: Write Today for Free Literature!

HOSSFELD MANUFACTURING CO.
438 W. 3RD STREET WINONA, MINNESOTA

SHOP EQUIPMENT NEWS

(Continued from page 30A)

The new "jewel-tone" Plexon Artcraft-strip comes in individual hanks, in 100-yard spools, and in box assortments.

Additional information can be obtained from X-acto, Inc.

(For further details encircle index code 0803)

SIGMA DRAWING SET

Eugene Dietzgen Company announces the Sigma Drawing Set. It features high impact case and finger tip selection. The case is made of high impact non-breakable plastic that withstands maximum abuse. It

Sigma Drawing Set

will not rust, warp, or bind, and it may be washed to retain its new, fresh appearance for years. A Flip-Stand cover makes all instruments instantly and easily accessible.

The instruments fit today's needs, selected after extensive research. Rugged in construction, made of nickel-silver and steel, the instruments are warranted for the lifetime of the purchaser.

(For further details encircle index code 0804)

THE EICO RA-6 TRANSISTOR PORTABLE RADIO

Electronic Instrument Company, Inc., announce a new model, the EICO RA-6, U. S. made, 6-transistor portable radio that can be purchased in either kit or wired form.

The EICO RA-6 Transistor Portable Radio

This is a modern portable radio that is not only easy creative fun to build but at the same time provides lifetime big set performance. The EICO RA-6 features high sensitivity and selectivity, and high undistorted sound output in a size that is just right for carrying around comfortably. It is equipped with a built-in Ferrite loop antenna, pre-aligned RF and IF transformers, a 4 by 6-in. oval PM speaker,

(For more information from advertisers, use the postcard on page 55A)

a high impedance earphone jack, and is housed in a sturdy simulated tan leather carrying case with a retractable handle.

The RA-6 is designed and engineered so that even the novice can build it and obtain a handsome professional assembly and outstanding performance. With plug-in transistor sockets and pre-aligned transformers, no test instruments or alignment is required.

Further information available.

(For further details encircle index code 0805)

WELDWOOD CHALKBOARD RELEASED

Flexible Materials Division of United States Plywood Corporation have introduced an economy model of the well-known Weldwood Chalkboard, the porcelain-faced steel chalkboard with the magnetic surface.

Weldwood Chalkboard "24 Series"

The new Weldwood Chalkboard "24 Series" is, like the more expensive series, a balanced construction. To a plywood core are laminated 24-ga. steel face and backing sheets. The backing sheet protects against moisture and balances construction. The face sheet is magnetized and porcelain-coated.

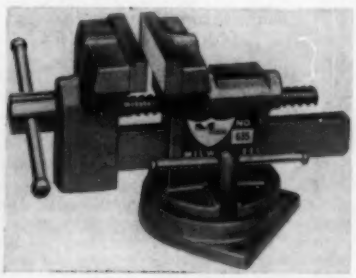
Weldwood Chalkboard "24 Series" is available in five standard colors — pale green, gray, blue, brown, and charcoal — and 15 standard sizes. Installed price is approximately 30 per cent less than the original version.

Samples are available upon request.

(For further details encircle index code 0806)

NEW FULL-SIZE BENCH VISES

Milwaukee Tool & Equipment Company have developed two new full-size bench vises.



New Model 635 Bench Vise

(Continued on next page)

NOISELESS, SHOCK PROOF, A.C. WELDER

IDEAL FOR CLASSROOMS... SAFE—SILENT

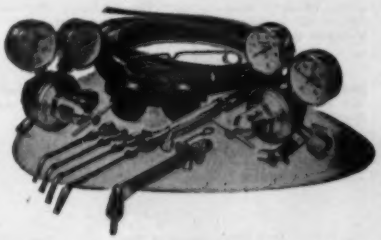
Marquette's new 90 Series Welder is best for classrooms because it is shock-proof, noiseless and makes arc striking easier. Why? The welder is enclosed in tough, durable fibre-glass which is *non-conductive!* The "Perma-Shield" cabinet eliminates eddy current losses, noisy vibrations and shock-danger. This new welder is ten per cent more efficient and provides improved arc striking characteristics... advantages that teachers and students alike will welcome.

That's not all! The fibre-glass cabinet is rustproof, colorproof, waterproof and moisture proof. It's stronger than steel but lighter in weight and practically indestructible. The entire welder is best for training purposes because it's easier to operate (heat taps are clearly marked and safe, positive and easy to select), it's built to last longer and it will always keep its new appearance.

Two sizes in four models are available. One delivers a maximum of 200 amperes; the other, 275 amperes and each is available capacitor equipped, for increased power factor.

WHAT DOES ANODIZED ALUMINUM MEAN TO WELDING TORCHES?

It's new and Marquette's got it! Oxy-acetylene welding torches made of *anodized aluminum* make them 50 per cent stronger and 50 per cent lighter. Precision made, they're practically unbreakable and will stand years of rough handling. Makes them perfect for training schools. Eliminates factory service because they're equipped with fast change O-ring seals. Simply replace worn seals with new ones and the torch is ready for action in minutes time. Three models (Aero-Jet, Star-Jet and Super-Jet) are available for welding and cutting all thicknesses of metal.



WHAT KIND OF ROD DO YOU WANT?

Marquette makes a welding electrode or gas rod for every welding application. From its famous No. 130 Red Rod for getting deep penetration in dirty, rusty metal to its No. 15 Presto-Arc rod for high speed welding of sheet metal, Marquette offers the best for any shop. This range of rods includes high tensile, hard surfacing, cast iron, special alloys and bronze rods.

WRITE FOR THESE FREE FACT-PACKED BULLETINS

1 The 90 Series Arc Welder
2 Jet Series Welding Torches
3 Guide to Better Welding

When it Comes to Welding Come to

MARQUETTE
WELDING EQUIPMENT

Marquette Manufacturing Company, Inc., 307 East Hennepin Avenue
Minneapolis 14, Minnesota

SHOP EQUIPMENT NEWS

(Continued from previous page)

Built by craftsmen for home craftsmen, the two vise models are rugged, built of high tensile gray iron, and are perfectly finished and machined. Each Acme threaded vise screw is accurately threaded, for smoothest performance, tightest grip. The finish is attractive hammered silver. Model 625 has a jaw width of 3½ in., with a jaw opening of 3½ in.

Fixed pipe jaws take pipe ⅛ in., to 1 in., in diameter. Model 635 has the same specifications as the Model 625. In addition, Model 635 swivels through 180 deg. A positive locking nut locks it securely with a touch of the fingers.

(For further details encircle index code 0807)

NEW KODAK VERIFAX BOOK COPYING UNIT

Eastman Kodak Company have added to their line of Verifax Copiers a portable copying unit with a fool-proof photographic mind capable of memorizing a page in virtually any book.

Over 95 per cent of the book material in any library can be copied by the new Verifax Book Copying Unit. The unit, designed as an accessory for other Verifax Copiers, makes exposure of books, magazine pages, or other documents up to a maximum size of 8½ by 11 in., within ten to fifteen seconds. The exposed matrix paper is then activated to produce copies in any of the four Verifax Copiers now on the market. Five, dry long-lasting copies are available from the single matrix in about one minute and at a cost of only 2½ cents each.

Verifax Book Copying Unit

Designed for use in the library and educational field, and in many areas of business and the professions, the new copying accessory is uniquely designed to assure complete-page copies of the most tightly-bound books. A vertical wedge-shaped exposure section is a key feature of the copying unit. It copies a full page of text complete down to the binding. The book is safely supported during the exposure to prevent damage to the binding.

The unit weighs 13 lb., and a carrying case is available. The latent, image-keeping quality of the Verifax matrix paper, allows a time lapse of several days between exposure and processing if necessary.

For more information on additional important features of this new Verifax Book Copier, please write.

(For further details encircle index code 0808)

DISPOSABLE CLOTHING REDUCES COSTS

The General Scientific Equipment Company has announced a practical, low-cost line of disposable clothing for industrial, laboratory, institutional, and commercial use.

Disposable clothing for industrial use

These garments are attractively styled and durably constructed of newly developed materials. Maximum wear-resistance is obtained for heavy duty jobs where protection against soil is most needed.

This disposable clothing is soft, light weight, and comfortable, just like woven cloth. They are sanitary because each worker receives a brand new garment each wearing time. No more frayed or patched appearance, no buttons missing, no holes repaired.

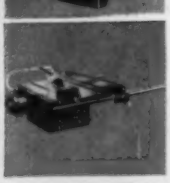
Available in shirts, pants, laboratory coats, hats, boots, aprons, and gowns, and

(Continued on page 36A)

Buy Right—Save BIG!

BOICE CRANE POWER TOOLS

serve you best because of their built-in RUGGEDNESS which assures long life—ACCURACY which permits better work—CAPACITY which allows wider use—CONVENIENCE which saves you time—SAFETY FEATURES.



DRILL PRESSES Medium and Heavy Duty. ½" — ⅝" — 1" Class. 15" — 18" — 24". Bench and floor models. Belt and gear driven. Multiple spindle models. As low as, **$132.00**

●

SHAPERS Big, rugged, large capacity. Triple V-belt drive. ½" and ¾" cutting arbors on one-piece spindle. Cutter capacity up to 6½" dia. x 3" wide. As low as, **$243.55**

●

PLANERS 12½" x 4½". Rugged 1-piece cast frame. Planes a veneer-like 1/16" on up to 4½" thick without tearing. As low as, **$349.50**

●

JOINTERS 6" x 60". Oversize head and 4-foot 2-lock fence. Planes 12" wide. Wide infeed table makes rabetting safe, easy. Also 8" x 84" model, and a 6" x 36" model as low as, **$119.95**

●

14" BAND SAWS Cut up to 400% faster and so smooth as to reduce sanding by half. 13½" blade to guard. Permit 27-inch dia. work. Guide to work table: 7¼". As low as, **$219.50**

●

TABLE SAWS The popular new 10" Monomaster with single control and lefthand tilt, powered up to 3 H.P. Also a 10" Tilt-Arbor model. Full-floating, frictionless, rolling motor drive gets all the power to the blade. Blades retract fully below table without added tension loads on belt or bearings. As low as, **$184.50**

●

Send today for free power tool catalog and prices.

FREE TO INSTRUCTORS: 16-page Instruction Booklet on Metal Spinning for Beginners.

DO-IT-YOURSELF PROJECTS BOOK: 24 Pages. Illustrated. Includes Procedures. Molding designs. Nail chart. Send 25¢ stamps or coin.

BOICE-CRANE COMPANY
932 W. Central Avenue **Toledo 6, Ohio**

Please send free catalog and prices.

NAME.....

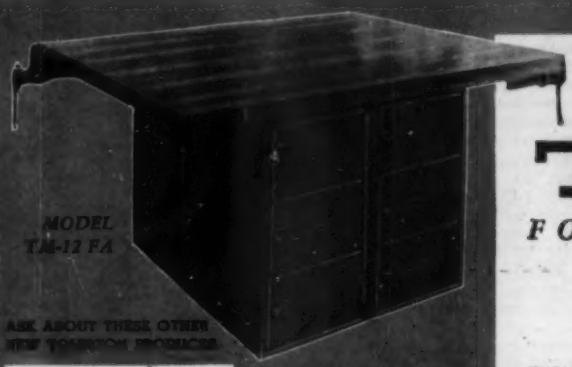
SCHOOL.....

STREET.....

CITY & STATE.....

SEND TODAY FOR FREE POWER TOOL CATALOG AND PRICES

(For more information from advertisers, use the postcard on page 55A)



ASK ABOUT THESE OTHER NEW TOLCO PRODUCTS

ARC WELDING BENCH
MODEL TAW-3660
With 20 gauge steel "see-thru" welding shield to eliminate eye flashburn while students observe demonstration.

MOLDING BENCH
MODEL TMB
Sand storage area completely lined with heavy-gauge hot dipped galvanized steel. Back panel and top shelf used to store tools. Removable maple shaker bars.

NEW

TOLCO

FOUR STUDENT BENCH

Gives 50% more horizontal project storage space

The "built-to-take-it" heavy-gauge steel TM-12 FA provides 12 individual lockers, 6 each side. Each locker is numbered 1 to 6, and fitted with ballpoint fasteners and mating pulls, and lugs for padlocks.

Tolco tops are built to take it, too. Laminated of 100% Northern hard maple, an exclusive steel spline, and ⅜" through bolts, they'll never bow or sag. Want more information? Write, wire or phone.

Established 1894

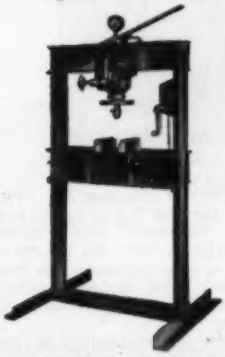
THE TOLERTON COMPANY

265 North Freedom Avenue • *Alliance, Ohio*

"SELLING TO SCHOOLS THROUGH TOP RATED DISTRIBUTORS"

DAKE PRESSES for School Shops

Shop training is most helpful when your pupils use the same practical presses they are apt to find when they work after graduation.



DAKE HYDRAULIC PRESS Model 25 H

Includes pressure gauge, hand wheel for rapid advance, automatic ram return, and table lifting device. 25 tons capacity.

DAKE ARBOR PRESSES

Have large opening and slotted table plates. Available in single and compound leverages, with capacities from 1 to 25 tons.

Catalog No. 350 describes Dake Presses suitable for school shops. Write for a free copy.

DAKE CORPORATION 653 Robbins Road Grand Haven, Mich.

Model 412CSC

Lightweight and Comfortable

SAFETY SPECTACLES

90% Protection Most Workers will wear 100% of the time

"Tuc-Away", featherlight Safety Spectacles provide the protection and wearing comfort that pleases most wearers.

Optically Correct, shatterproof methacrylate lenses snap in and out of the frame . . . can be easily replaced by each worker.

Choice of interchangeable Lenses with side and bottom protection give greater flexibility and economy . . . Lens colors: Clear, Light, Medium and Dark Green and Gold.

3 Temple Styles for greater comfort . . . Metal or Plastic Temples with "retrax" adjusting action, or Plastic Club Temples.

WRITE FOR FULL INFORMATION

WATCHEMOKET OPTICAL CO., INC.

232 West Exchange St., Providence, R. I.
In Canada: Levitt-Safety Limited, Toronto 10, Montreal 26, Winnipeg

(For more information from advertisers, use the postcard on page 55A)

SHOP EQUIPMENT NEWS

(Continued from page 34A)

economically priced, disposable clothing is excellent, too, for plant visitors. Fire-resistant and water repellent, this disposable clothing can be worn by both men and women, over street clothes or as an outer garment. They are lint free and can be autoclaved.

For complete information write for Bulletin No. 700.

(For further details encircle index code 0809)

GRE-SOLVENT POWDERED HAND SOAPS

The Utility Company, Inc., makers of Gre-Solvent, offer three practical hand cleaners for fast, thorough, and pleasant results for shop instructors and students.

Gre-Solvent nonabrasive Powdered Hand Soaps are available in attractive, sturdy wall dispensers. Never harsh, always safe, Gre-Solvent Powders help prevent dermatitis. They are available in all sizes from 5-lb. boxes to 300-lb. fiber barrels.

For at-the-bench cleanups, the company has also marketed its *Cope* Waterless Hand Cleaner, with 5-lb. can dispensing unit. The special plunger dispenses just a sufficient quantity of the delightful creamy product for an average washup. Just rub on and simply wipe off. Hands come clean. Contains skin-protecting lanolin. A fresh 5-lb. replacement can is inserted into the dispenser instantly.

Cope is equally effective with or without water for completely removing grease, paint, glue, tar, cement, calkings, asphalt, and other chemical stains. For personal and home use, *Cope* is available in paint, hardware, and auto supply stores in 15-oz. cans, 5-oz. tubes, as well as 5-lb. cans, 8-lb. cans, and 50-lb. cans for shop use.

Three Practical Hand Cleaners

Gre-Solvent Paste, another favorite among mechanics, is available in 1-lb., 3-lb., and larger cans.

Full information available.

(For further details encircle index code 0810)

WORK TABLE STOOLS ADDED TO KRUEGER LINE

The Krueger Metal Products Company has recently added four models of bench-work stools to its portable-seating line. Besides a standard model available in 18-, 24-, or 30-in. heights, the same stool is available with a horizontally adjustable backrest. Other models include a Standard Stool with adjustable telescopic legs which permit raising the seat height as much as 9 in., in 1-in. increments; and a similar model which also includes the adjustable backrest. Tall or short, whatever the individual's physical build, Krueger's adjustable stools can quickly be adapted to the sitter's comfort.

Adjustable Leg and Backrest Stool

Krueger stools feature heavy-duty construction throughout. Legs are heavy-gauge, electrically seam-welded tubular steel, cross-braced with a securely welded tubular steel ring. The extra large die formed steel seats have a fully beaded bottom edge to safeguard against injury or clothing damage, and also feature a recessed Masonite seat panel for added comfort. Adjustable backrests feature a tubular frame with a curved, form-fitting steel panel.

Complete information available.

(For further details encircle index code 0811)

(Continued on page 38A)

THINKING OF A NEW OR EXPANDED ELECTRIC SHOP?
flexlab electric supply and distribution equipment
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SHOP EQUIPMENT NEWS

(Continued from page 36A)

HIGGINS AUTOMATIC DRAWING INK DISPENSER

Higgins Ink Company have developed a new kind of drawing ink dispenser called Ink-A-Matic. It permits artists and draftsmen to fill drafting instruments almost automatically, with one hand. It can speed up ink tracing and drafting work by 32 per cent, because it eliminates the need for repeatedly transferring instruments and stoppers from hand to hand while filling.

In using Ink-A-Matic the artist may keep one hand on his work all the time. This is particularly important when doing precise tracings and register work. "Left-hand" Ink-A-Matics may be ordered at no extra cost.

Higgins Automatic Drawing Ink Dispenser

The ink bottle stands securely in a non-skid rubber base. The slightest touch on the lever at the side lifts the stopper, and brings the pen filler into position. Just a touch and the pen is filled without mess or waste. Ink-A-Matic always feeds just the right amount of ink into ruling instruments.

The pen may be rotated for most convenient filling angle. The lever may be clamped back so the bottle stays open when a dip pen is used.

(For further details encircle index code 0812)

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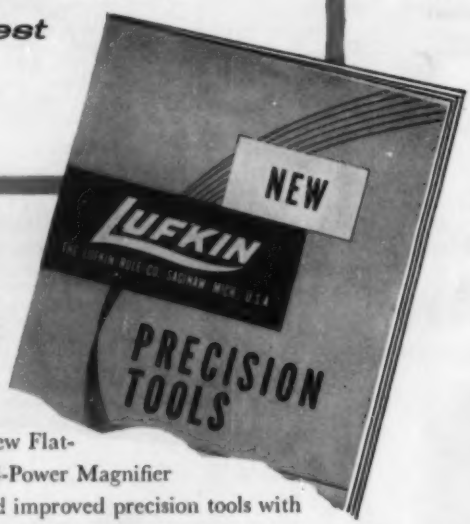

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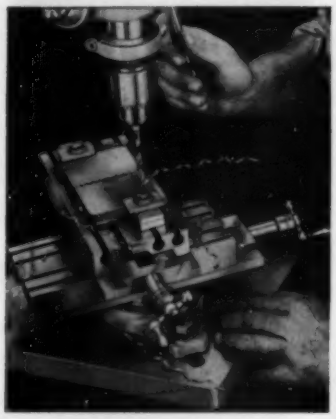
SOUTH BEND LATHE UNIVERSAL TABLE

Providing for almost unlimited position control, this South Bend Lathe Universal Table affords the greatest amount of flexibility for milling, for drilling, and for use on the shaper.

Both upper and lower slides have graduated swivels and may be turned through full 360 deg.



South Bend Lathe Universal Table

Slides can be used without graduated swivels to reduce height if desired. They can be positioned at any angle with each other and may be turned individually or together. Each slide has feed screw with micrometer collar reading in thousandths of an inch. Dovetails are equipped with full length gibs for take-up. The precision ground work surface is 4 by 8⅞ in., and maximum travel is 4 in., for either slide. Table has four slots for clamping work. Clamp bolts fit snugly into round slots in such a way that there is little danger of breaking out or otherwise damaging the slots. Slides and bases may be purchased separately if desired.

For more complete information and specifications write South Bend Lathe Works.

(For further details encircle index code 0813)

STANLEY LINE OF EXTRA HEAVY-DUTY GRINDERS

Stanley Electric Tools, division of The Stanley Works, has announced a new line of extra heavy-duty grinders recommended for machine, metal, or automotive school shops. Rigid and powerful, they are available in ½ h.p. (No. 637), ¾ h.p. (No. 638), and 1 h.p. (No. 640). Cast iron tool rests are adjustable for height, angle and distance from wheel. Extended frame con-

(Continued on page 40A)

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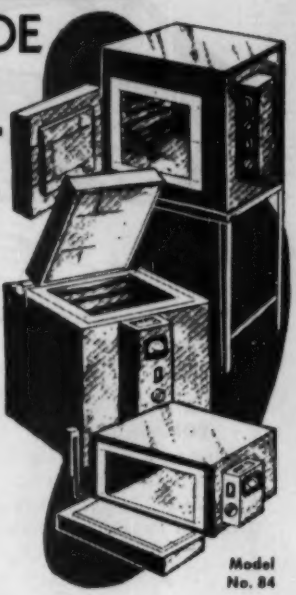

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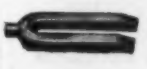

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FITS ALL YOUR WORKERS COMFORTABLY:

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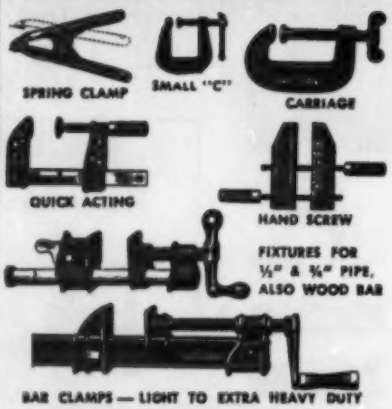

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THE CINCINNATI TOOL COMPANY
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SHOP EQUIPMENT NEWS

(Continued from page 38A)

struction permits grinding large odd-shaped parts. Wheel guards are drilled for eye-shields and have exhaust outlets and spark shields. Switch is recessed. Grinders have capacitor start and induction-type motor,

Stanley Heavy-Duty Grinder and Pedestal

full ball-bearing construction lubricated for life. Standard equipment includes fine and coarse grinding wheels.

Also available is a new heavy-gauge welded steel construction pedestal (No. 626) designed for use with the above grinders, as illustrated. It has a heavy duty door latch, water pot and tray and is equipped with three shelves, 9⅞ in. deep for storing accessories. Provision is made for floor and grinder mounting for all above-mentioned grinders.

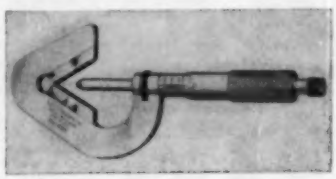
Pedestal may also be used with two new ¼- (No. 635) and ⅓-h.p. (No. 636) heavy-duty grinders of similar design also available from Stanley Electric Tools.

Further information is available.

(For further details encircle index code 0814)

STARRETT NO. 483 V-ANVIL MICROMETER

An improperly adjusted centerless grinder can produce work that is deceptively out-of-round. Conventional two-point measuring tools, which check diameter only, will pass the work. No. 483 V-Anvil Micrometer made by the L. S. Starrett Company, has three-point contact which quickly detects out-of-round, alerts the operator to the need for machine adjustment and saves making costly scrap.



Starrett No. 483 V-Anvil Micrometer

No. 483 is also designed for measuring three-fluted cutting tools — taps, milling cutters, reamers, etc. A companion micrometer, No. 485, measures five-fluted cutters.

These V-anvil micrometers are used like conventional outside micrometers with the

(Continued on page 42A)

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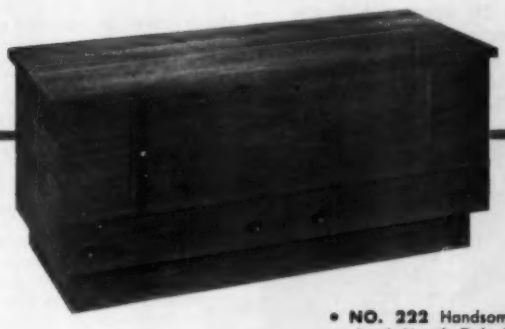
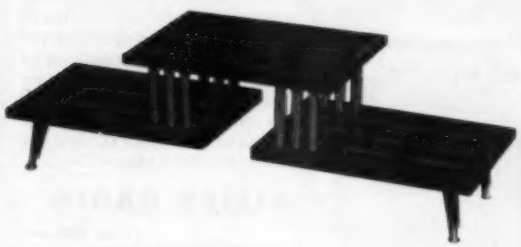
• **NO. 250** Red Cedar Superdeep Storage Chest with convenient drawer for small garments. Chest is 19¼" deep inside, has 4" by 33½" drawer, with plywood bottom. Overall size 26" high, 46¾" long, 20⅛" wide. Solid Cedar except 5 ply top. Roomy!



• **NO. 222** Handsome! Spacious! Limed Oak Chest of Oak and Cedar veneer 5 ply panels. Back and bottom solid Cedar. No drawer. All trim is solid Oak. 20" wide, 46" long, 20" high. Limed Oak Finishing Kit is separate.



• **NO. 15** Occasional table of rare beauty. Top matched Cedar plywood. Dowels in white wood. Brass ferrules on legs. Top size 17¼" by 57½", stands 16¼" high. Smart! Unusual design!

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P. O. Drawer 1091 — ASHEVILLE, N. C.

SHOP EQUIPMENT NEWS

(Continued from page 40A)

cutter held in one hand and the spindle face against one cutting edge with the cutting edge lined up with the spindle axis. The reading is taken directly in thousandths from the micrometer thimble.

Precision features of these micrometers include V-anvils, and spindle precision aligned to form perfect tangential contact, finely lapped carbide facings to eliminate wear from continuous use under abrasive conditions, hardened and ground-from-the-solid spindle screw, no-glare satin chrome finish for easy reading in any light and balanced design for easy, one-hand measuring.

Complete information available on request.

(For further details encircle index code 0815)

TANDY'S LEATHERCARVING KIT

Tandy Leather Company has introduced their new Handy-Carve, an all-in-one leather working tool.

Tandy's Leathercarving Kit

A set of tools within itself, the Novel Handy-Carve is equipped with a knife edge at one end to cut outlines, make decorative cuts, and to give texture or background variations. At the other end is a spoon-shaped modeler to give contour and shading.

The new Handy-Carve Billfold Kit offers craft enthusiasts a fast, easy and exciting introduction to leathercraft. In the kit is everything needed to complete a fine, quality-leather billfold including natural tooling calfskin back with lacing holes punched, long-wearing goatskin insides with 3 card pockets, leather lacing, complete craft-aid pattern and assembly-instructions plus the new Handy-Carve Tool.

For beginners or professionals, or for children, Handy-Carve brings excitement and fun to leathercraft.

(For further details encircle index code 0816)

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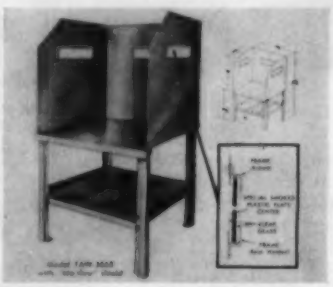

Tolerton Arc Welding Bench

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(Continued on page 44A)

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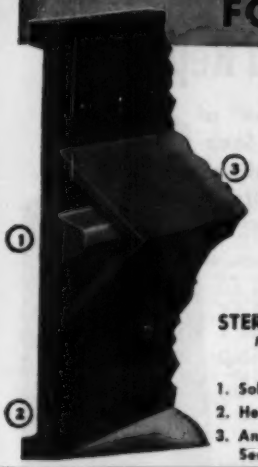

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C7702 ART TABLE

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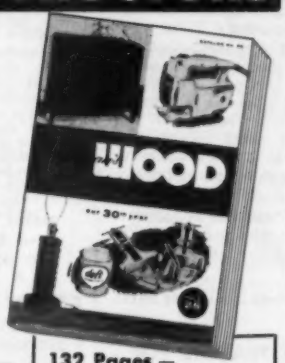

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SHOP EQUIPMENT NEWS

(Continued from page 42A)

"see-through" shield. Model TAW-3668 allows several students to observe simultaneously through smoked plastic plates without special glasses or masks. The 20-ga. "see-through" steel shield easily snaps on top ledge with no bolting required. Top working surface, constructed of 12-ga. steel, measures 36 9/16 by 36 in. Shelf divided into three equal 11-in. sections for rod storage. Total approximate weight 180 lb.

Further information available from The Tolerton Company.

(For further details encircle index code 0817)

REVOLUTIONARY NEW PENCIL

Venus Pen & Pencil Corporation have announced a new kind of lead pencil that writes as black as a soft pencil, is as strong as a hard pencil, makes many carbon copies, and reproduces clearly on office duplicating machines.

The Venus 3500

The Venus 3500 needs less sharpening, will break — but not by writing, and is economical to the business and industrial buyer.

The new development in lead pencils is due to the creation of a vastly improved clay and graphite structure formed through new methods of processing. These new materials and manufacturing methods affect the heart or core of the lead. Instead of building the lead from the outside in, Venus has reversed the process and is building it from the inside out. The result is a lead which holds a sharp point longer. The point is stronger both in a needle point for fine detail writing and blunt point for bold black writing.

The Venus 3500 is making its appearance in a rich yellow with white crackle.

More detailed information available from the manufacturer.

(For further details encircle index code 0818)

NEW COMFORT FEATURE FOR TUC-AWAY GOGGLES

Watchemoket Optical Company, Inc., have introduced new, smooth, pink plastic temple hooks as standard ear pieces on all Watchemoket Tuc-Away goggles with plastic Retrax temples. They are designed to provide greater safety, a more comfortable behind-the-ear fit, and a more attractive appearance. These new hooks slide in and out of the temples for easy adjustment by the wearer and, once adjusted, they hold

(Continued on next page)

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firmly in place with maximum comfort and minimum pressure.

This Retrax feature and Tuc-Away's universal nose bridge make it possible to stock one size goggle and fit all workers quickly and perfectly.

Tuc-Away Goggles

Tuc-Away also features optically correct, interchangeable, heavy impact lenses which snap in and out of the frame for easy replacement by the wearer. These lenses are available with integral side shields for added protection.

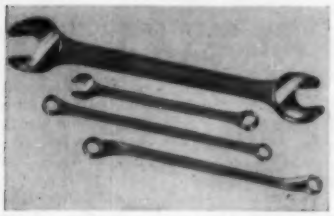
These new hooks are also available in Retrax temples on Visor-Tuc, Methaspec, and Rapido goggles.

For complete information, contact your Watchemoket distributor or request information from the manufacturer.

(For further details encircle index code 0819)

WILLIAMS IMPROVED DESIGN WRENCH LINE

J. H. Williams & Company, manufacturers of wrenches, tools, and drop-forgings, is now making a line of open-end, combination box-open end and 15- and 45-deg. offset box wrenches of improved design.



Improved Design Wrench Line

Among the many refinements to the line are slimmer, more comfortable handles, smoother contours, and strong, thin heads that allow maximum clearance in close quarters.

The new design has imparted a "balanced feel" throughout all sizes in the four styles of wrenches offered.

(For further details encircle index code 0820)

"MAINLINER" BY WEBER

F. Weber Company have recently introduced their new "Mainliner" set — an attractive oil color outfit, designed for the artist. This compact oil color kit contains the finest colors and materials throughout. The box and palette are of white mahogany. Strong, gleaming hardware, with contour handle of lacquered steel. The inner dimensions of the box are 13¼ by 9¼ by 1⅞ in.

The "Mainliner" is outfitted with the following artist materials: 10 tubes 1 by 4-in. Weber FAQ colors including Permalba; 1 white mahogany pallette 9 by 13

(Continued on next page)

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Bethel, Connecticut

SHOP EQUIPMENT NEWS

(Continued from previous page)

The "Mainliner" Set

in.; 2 red sable brushes; 2 bristle brushes; 1 palette knife; 1 canvas board; 1 bottle of turpentine; 1 bottle of linseed oil; 1 bottle of Synvar; and 1 double palette cup.

For further information write to F. Weber Company.

(For further details encircle index code 0821)

NEW DESIGN OFFICE DESK

Columbia-Hallowell Division of Standard Pressed Steel Company have announced an office desk designed to effect substantial economies in office floor area. Known as the Ampla, this new desk is the latest addition to the Columbia line of steel office furniture. This company is also widely known in the industrial field for its Erectomatic steel shelving and Hallowell shop furniture.

The secret of Ampla's space saving is a unique design that eliminates the usual center drawer. Time-motion studies disclosed that the center drawer's normal use as a kind of catch-all did not justify its existence from the standpoint of useful storage space. In addition it required extra "push-back" space between desks to allow it to be pulled out. By eliminating the drawer, this space is made available as usable floor area, permitting desks to

New Space-Saving Office Desk

be placed close enough to pick up room for one additional unit in each standard five-desk space. Personal comfort and work area are unimpaired as Ampla comes in standard top sizes and has two shallow drawers in one pedestal to accommodate belongings commonly stored in the center drawer.

An additional advantage is enlarged knee space. The arms of executive swivel chairs fit freely under the desk, permitting the chair to be stowed neatly away when not in use.

For descriptive literature and prices, write to the manufacturer.

(For further details encircle index code 0822)

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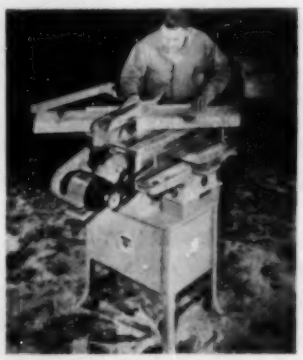
NEW DELTA SAW-JOINTER COMBINATION

Rockwell Manufacturing Company's Delta Power Tool Division has introduced a new low-cost saw-jointer combination specially designed for commercial woodworking shops, the building trades, and light industries.

The new unit combines on a single stand the deluxe Delta 4-in. Precision Jointer and the standard 9-in. Tilting-Arbor Cir-



New Delta Saw-Jointer Combination

cular Saw. It is powered by an all-new Delta full one-horsepower motor that develops more than 2 horsepower under load.

The chief advantages cited for the new combination machine are lower cost, por-

(Continued on page 48A)

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FOR THE
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SHOP EQUIPMENT NEWS

(Continued from page 46A)

tability, convenience, and simplification of materials handling. As both machines operate off the same motor, initial motor investment is cut in half.

The machine weighs only 260 lb., including the motor. The 9-in. saw cuts to the center of a 4-ft. panel, cross cuts stock 2¾ in. thick, and cuts a full 2 in., at a blade tilt of 45 deg. The deluxe jointer will joint and plane stock up to 4 in. wide.

Further information available.

(For further details encircle index code 0823)

BRUNING COMPANY TO DISTRIBUTE DOCUMAT EQUIPMENT

The Charles Bruning Company and Documat, Inc., have concluded an agreement under which the Bruning Company will distribute and service Documat microfilm cameras, readers, and related equipment in the United States and Canada.

The Documat F16 Microfilm Flow Camera

Documat's products include the F16 camera, PFA camera, Documat Reader, and Reader-Printer.

The F16 flow camera produces low reduction (16x) maximum quality microfilm images from one side of the document to be photographed. The PFA flow camera produces high reduction (34½x) duplex microfilms. It reproduces both sides of the original simultaneously and records the images side by side on film. It also can be adjusted to record twice as many documents in two parallel tracks on a single film roll. Both cameras are designed for office use.

There are four models of the Documat Reader, each of which produces an unusually bright image. All models can read either roll or flat film.

The Documat Reader-Printer is a new development expected to be in full production later this year. It automatically produces positive prints from the negative microfilm with push-button operation. In addition to its printing and processing sections, this model embodies all the features of Documat Readers.

Further information available upon request.

(For further details encircle index code 0824)

(Continued on page 50A)

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SHOP EQUIPMENT NEWS

(Continued from page 48A)

POWERMATIC NEW 10-IN. TILTING ARBOR SAW

Powermatic Machine Company have announced the development of a new 10-in. Tilting Arbor Saw, known as Model 65. This new unit has been designed for utmost efficiency, dependability, and safety in high production, on the building site or in the smallest school or woodworking shop. It accommodates motors from 1½ to 3 h.p., with equal ease. The new trunnion is precision

Powermatic 10-in. Tilting Arbor Saw

machined from heavy-duty gray iron castings for extra strength and perfect alignment. Equipped with optional oversize bearings, the new saw can be driven by motors exceeding 3 h.p., if desired.

The new C-flange motor mount design relieves the trunnion pivot shaft of all weight and permits saw blade to be raised, lowered, and tilted with extreme accuracy and ease. Regardless of blade positioning, tension on the three A-section drive belts is constant, utilizing a ⅝-in. arbor, which is adjusted through a worm gear mechanism.

The cast iron rip fence is precision machined and supported by two rigid tubular guide bars. The front bar is calibrated for accurate vernier control adiustment through a convenient knob.

Full details and specifications on the new Model 65-10 in. Arbor Saw may be obtained free by writing for Bulletin 74.

(For further details encircle index code 0825)

NEW HEAVY DUTY BATTERY CHARGER

Snap-on Tools Corporation have released for national distribution a new heavy duty selenium type battery charger which delivers 50 ampere charging on 6- or 12-volt batteries. It incorporates a selenium rectifier for long, trouble-free service. Completely enclosed in its own metal case, the charger performs in all types of weather.

Operating voltage is 115 volts, 60 cycle a.c. Silicon lubricated fan system operates automatically to dissipate internal heat through louvered ventilation ducts. All controls, an ammeter, and brief operating instructions are on top of the case, under a hinged cover. Controls are: Timer Control Knob sets timer for any length of time up to 60 minutes (for quick charge); Charge Rate Selector Knob can be set to "Trickle" for slow charge, "Low" and "Medium" for sulfated batteries, and "High" for fast charge; Battery Voltage

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For further information on other pertinent details of this charger, write to the manufacturer.

(For further details encircle index code 0826)

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Desmond Bros. have discovered that industrial arts instructors face a major problem of the short life of expensive finishing brushes. Field men for Deft Wood Finish have found that painting contractors have the same trouble.

Larry Diaz, 30 years a painting contractor in Los Angeles, supplies the answer. *Don't clean the brushes.*

Instead, he designated two brushes to be used for Deft-finishing alone. After using, he merely kept them in a closed gallon can, about a third full of Deft. On the next job, they were soft and pliable and ready to use. The illustration shows his two brushes after three years of constant use, not only as good, but more pliable than when they were first purchased.

Mr. Diaz points out another factor. After a brush has been cleaned and before using, it is customary to test the pliability of the bristles by bending. He maintains that no matter how well they have been

Deft Wood Finish

cleaned, small particles of the previous finish material remain in the brush and will then break off to be brushed into the new finish to cause trouble.

(Continued on next page)

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SHOP EQUIPMENT NEWS

(Continued from previous page)

Consequently he accomplishes three things with his method. He protects the life of his expensive brushes, he eliminates the bother of cleaning them, and he is assured of a flawless trouble-free finish on each job.

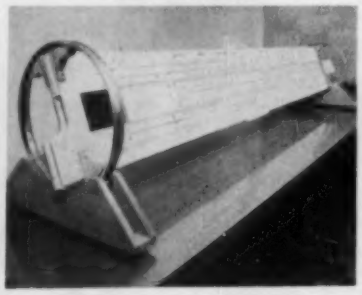
However, he does caution that the brushes should have natural handles as colored handles will contaminate the Deft Wood Finish.

The same brush-saving effect may be had by suspending brush in a partially Deft-filled fruit jar with a brush holder, or the brushes may be kept wet indefinitely in an air-tight Saran-type wrap.

(For further details encircle index code 0827)

TRUNDLE MOUNTED DEMONSTRATION SLIDE RULE

Keuffel & Esser Company recently introduced an 8-ft. demonstration slide rule mounted on specially designed trundles that make possible complete 360-deg. turning of the rule without lifting.



Trundle-Mounted Demonstration Slide Rule

Created especially for use in teaching intermediate and advanced classes in slide rule operation, the new demonstration rule has the same scale arrangement and slide movement as the K & E standard 10-in. Log Log Duplex Decitrig.

The instrument owes its unusual mobility to the "wheel and axle" construction of the trundle unit. Pinioned at each end to large groove-rimmed wheels, the rule revolves freely as the wheels turn on revolving ball supports mounted in the trundle stand.

The convenience of this unit, where lectures demand frequent reference to both sides of the multi-scaled Deci-Trig, cannot be overemphasized to teachers.

For additional information about the new Trundle-Mounted Demonstration Slide Rule write to Keuffel & Esser Company.

(For further details encircle index code 0828)

NEW TOOLROOM MILLING MACHINE

The U. S. Burke Machine Tool Division have developed and made available a new vertical toolroom milling machine that has the range and capacity of larger mills. The new Millrite is built accurately and ruggedly to accepted machine tool tolerances. As a result, although low in cost, it is highly productive for precision milling and boring operations.

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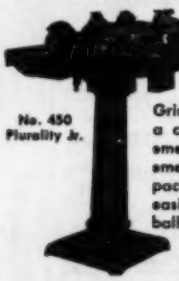

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Equipped with a swivel head, the Millrite is capable of angular, as well as vertical operations. The ram and turret machine has a 7 by 27-in. table with longitudinal feed of 16 in., crossfeed of

New Toolroom Milling Machine

8 in., vertical feed of 15 in., and ram movement of 12 in. Quill travel is 4 in. Maximum distance from the spindle nose to the face of the column is 16 in.; maximum distance from the nose to the top of the table is 18 in.

The U. S. Millrite has a hard, chrome-plated quill 3¼ in. in diameter. The column is one-piece ribbed, close grain cast iron. The overarm is internally ribbed and has a full 7½ in. diameter flange to which the head is attached.

Full information on the new Millrite is available by writing.

(For further details encircle index code 0829)

Descriptive Material...

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(For further details encircle index code 0830)

ATKINS NEW "HANDSAW MANUAL"

Atkins Saw Division, Borg-Warner Corporation has released their new 28-page, fully illustrated "Handsaw Manual."

This manual contains much valuable information on the design and construction of handsaws. Types of handsaws and basic types of saw teeth are described and illustrated. Easy-to-follow instructions are given on jointing, shaping, setting, and sharpening. Also shown are the saw tools and accessories used in proper saw care.

(Continued on next page)

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"Organized Dreaming: . . ." are the two lead words in the title of a fascinating article about designing futuristic models in DUN'S REVIEW, July, 1959. In it are revealed the long term aims that motivate many manufacturers to become product visionaries. The report makes no estimate of the millions of dollars invested annually in "idea" programs. What benefits a company hopes to get out of building and testing futuristic models are disclosed in resumes of the advanced activities conducted by several producers of consumer and capital goods. Although most of the amazing new devices may not be available for years to come, the account nevertheless generates thoughts about how much easier and better life will be in the future as a result of the prototypes dreamed up by industrial designers.

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SHOP EQUIPMENT NEWS

(Continued from previous page)

This pocket size manual is 4¼ by 5½ in., with a heavy blue cover, making it suitable for carrying in the pocket, in the tool kit, or for hanging up beside the workbench.

Published primarily to be packaged with new Atkins saws, the "Handsaw Manual" is available to the public at 10 cents per copy to cover handling and postage.

(For further details encircle index code 0831)

BULLETIN DESCRIBES DELTA 20-IN. BAND SAW

Rockwell Manufacturing Company, Delta Power Tool Division, have made available their new 8-page illustrated bulletin which describes the recently introduced Delta 20-in. Metal-Wood Cutting Band Saw.

This two-color bulletin describes in detail all the features of the new Delta 20-in. Band Saw, and includes complete specifications, catalog listings, motors and motor controls for single-phase and three-phase operation, and a list of accessories.

Write for a copy of this bulletin.

(For further details encircle index code 0832)

Personal News from Industry...

BLACK & DECKER APPOINTMENTS

John F. Apsey, Jr., has been appointed to the newly created position of Director of Public Relations of The Black & Decker Mfg. Company.

G. Harvey Porter has been named to the position of Advertising Manager of the Company. He will assume the duties previously performed by J. F. Apsey, Jr.

James Otradovec is the new Assistant Advertising Manager, Industrial-Automotive Division, and Donald F. Reno is Assistant Advertising Manager, Hardware Division.

KESTER OPENS NEW FACTORY

Kester Solder Company started production of solder and fluxes in the firm's new west coast factory at Anaheim, Calif., on September 15, 1959.

All Kester products will be manufactured at the Anaheim factory — Flux-Core Solders, all types of Soldering Fluxes, Solderforms (Preformed Solder), and specialized Industrial Solders.

The home office remains at Chicago, Ill., with branches at Newark, N. J., and Brantford, Canada.

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